



BMJ Open is committed to open peer review. As part of this commitment we make the peer review history of every article we publish publicly available.

When an article is published we post the peer reviewers' comments and the authors' responses online. We also post the versions of the paper that were used during peer review. These are the versions that the peer review comments apply to.

The versions of the paper that follow are the versions that were submitted during the peer review process. They are not the versions of record or the final published versions. They should not be cited or distributed as the published version of this manuscript.

BMJ Open is an open access journal and the full, final, typeset and author-corrected version of record of the manuscript is available on our site with no access controls, subscription charges or pay-per-view fees (<http://bmjopen.bmj.com>).

If you have any questions on BMJ Open's open peer review process please email info.bmjopen@bmj.com

BMJ Open

Dissemination of cognitive behavioral therapy in Japan from FY2010 to FY2015: a descriptive study using the nationwide claims database

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2019-033365
Article Type:	Research
Date Submitted by the Author:	01-Aug-2019
Complete List of Authors:	Hayashi, Yuta; University of Miyazaki, Graduate School of Medicine and Veterinary Medicine Yoshinaga, Naoki; University of Miyazaki, Organization for Promotion of Tenure Track Sasaki, Yosuke; University of Miyazaki, Department of Animal and Grassland Sciences, Faculty of Agriculture; University of Miyazaki, Center for Animal Disease Control Tanoue, Hiroki; University of Miyazaki, Graduate School of Medicine and Veterinary Medicine; University of Miyazaki, School of Nursing, Faculty of Medicine Yoshimura, Kensuke; Chiba University Hospital, Health Care Management Center Kadowaki, Yuko; University of Miyazaki Hospital, Clinical Research Support Center Arimura, Yasuji; University of Miyazaki Hospital, Clinical Research Support Center Yanagita, Toshihiko; University of Miyazaki, School of Nursing, Faculty of Medicine; University of Miyazaki Hospital, Clinical Research Support Center Ishida, Yasushi; University of Miyazaki, Division of Psychiatry, Department of Clinical Neuroscience, Faculty of Medicine
Keywords:	cognitive behavioral therapy, database, national health insurance, Japan, MENTAL HEALTH

SCHOLARONE™
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

Title of article:

Dissemination of cognitive behavioral therapy in Japan from FY2010 to FY2015: a descriptive study using the nationwide claims database

Corresponding author:

Naoki Yoshinaga, Organization for Promotion of Tenure Track, University of Miyazaki, General Education and Research Building (G704), 5200 Kihara, Kiyotake, Miyazaki 889-1692, Japan. E-mail: naoki-y@med.miyazaki-u.ac.jp Tel/Fax: (+81)985-85-9784

Authors:

Yuta Hayashi,¹ Naoki Yoshinaga,² Yosuke Sasaki,^{3,4} Hiroki Tanoue,^{1,5} Kensuke Yoshimura,⁶ Yuko Kadowaki,⁷ Yasuji Arimura,⁷ Toshihiko Yanagita,^{5,7} Yasushi Ishida⁸

¹ Graduate School of Medicine and Veterinary Medicine, University of Miyazaki, Miyazaki, Japan

² Organization for Promotion of Tenure Track, University of Miyazaki, Miyazaki, Japan

³ Department of Animal and Grassland Sciences, Faculty of Agriculture, University of Miyazaki, Miyazaki, Japan

⁴ Center for Animal Disease Control, University of Miyazaki, Miyazaki, Japan

⁵ School of Nursing, Faculty of Medicine, University of Miyazaki, Miyazaki, Japan

⁶ Health Care Management Center, Chiba University Hospital, Chiba, Japan

⁷ Clinical Research Support Center, University of Miyazaki Hospital, Miyazaki, Japan

⁸ Division of Psychiatry, Department of Clinical Neuroscience, Faculty of Medicine,
University of Miyazaki, Miyazaki, Japan

Word count: 2899

ABSTRACT

Objectives: To clarify the dissemination status of cognitive behavioral therapy (CBT) in Japan under the national health insurance scheme.

Design: Retrospective observational study.

Setting: National Database of Health Insurance Claims and Specific Health Checkups of Japan.

Participants: Patients who received CBT under the national health insurance scheme from FY2010 to FY2015.

Primary and secondary outcome measures: We estimated the change rate and the standardized claim ratio (SCR) for the number of patients receiving CBT and analyzed the association between the CBT status and several regional factors.

Results: We found that: (a) a total of 60304 patients received CBT during the study period; (b) the number of patients receiving CBT was highest in the first year (-1.8% from FY2010 to FY2015); (c) the number of patients who received CBT per 100000 population decreased (or remained at zero) in most prefectures (32 out of 47); (d) there was a maximum 424.7-fold difference between prefectures in standardized claim ratio for CBT; (e) the number of registered CBT institutions was significantly associated with the number of patients who received CBT.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Conclusions: The provision of CBT did not increase in the first six years (FY2010–2015) after its coverage in Japan's national health insurance scheme. Further studies including a questionnaire survey of registered CBT institutions are required to get more detailed information on the dissemination of CBT in Japan.

Strengths and limitations of this study:

- This is the first study to describe in the provision status of cognitive behavioral therapy (CBT) in Japan using a nationwide database which covers all electronic claims in Japan’s national health insurance system.
- The main limitation of this study is that our data does not include medical treatment data for any treatment provided outside the national system (e.g. private counseling).
- Our ecological analysis was conducted using specific variables, so there could be other factors which affect the provision of CBT.

32 INTRODUCTION

33 Disseminating effective treatment for psychiatric disorders is urgently required around
34 the world. Mathers and Loncar[1] reported that major depression is predicted to be the
35 leading cause of burden of disease in high-income countries by 2030; HIV/AIDS and
36 perinatal disorders rank higher only in low-income and middle-income countries.

37 Since the 1980s, effective psychological interventions for a wide range of
38 psychiatric disorders have been empirically developed. Among them, cognitive
39 behavioral therapy (CBT) has consistently been shown to be effective for various
40 psychiatric disorders on both a short- and long-term basis,[2-10] and has also been a
41 strongly recommended treatment option in some national guidelines.[11-15]
42 Importantly, patients often desire to receive psychotherapy rather than
43 pharmacotherapy.[16 17] However, there is evidence that empirically supported CBT is
44 rarely available (or is delivered suboptimally) in routine clinical care in Western
45 countries.[18 19]

46 In Japan, CBT was introduced to the psychiatric field in the late 1980s,[20] and
47 has been covered by the national health insurance scheme since FY2010. This marked a
48 milestone in Japanese mental health service where pharmacotherapy has historically
49 been much more common.[21-23] Subsequently, since FY2011, the Japanese Ministry

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

of Health Labor and Welfare (MHLW) has started to organize training for therapists to disseminate CBT. However, it is still unclear whether CBT is routinely implemented in Japanese clinical settings under the national health insurance scheme. Two studies have employed a questionnaire method to investigate the capability of providing CBT in Japanese psychiatric institutions, but the very low return/response rates (16.5% and 20.3%) limit the generalizability of the findings.[24 25]

The current study aims to assess the dissemination status of CBT in the first six years (FY2010–2015) after its inclusion in the national insurance scheme in Japan, using the nationwide claims database. Data on the actual dissemination status of CBT (including regional variations) has never been widely available, and such data is needed to estimate the unmet need for services, to promote open discussion between policy makers and general public, and to guide mental health care policy initiatives in the future.

METHODS

Main data source and extracted data

The present descriptive study was conducted using data from the National Database of Health Insurance Claims and Specific Health Checkups of Japan (NDB), a Japanese

1
2
3
4
5 68 nationwide health insurance claims database operated by the MHLW. Japan utilizes a
6
7
8 69 universal healthcare system (see online supplementary figure 1), and the NDB has all
9
10
11 70 electronic claims, 99% of all claims issued from hospitals and clinics,[26] and stores
12
13
14 71 approximately 1.9 billion claims annually. The claims data contains various clinical and
15
16
17 72 procedural information, such as patients' sex, age, month of examination, diagnostic
18
19
20 73 code, medical practice code, drug code, and hospital code. Personally identifiable data
21
22
23 74 (e.g. name, beneficiary identification number, date of birth) are automatically converted
24
25
26 75 into hash values at the time of storage in NDB to make it irreversibly anonymous.
27
28

29 76 We used accumulated NDB data from FY2010 to FY2015 regarding CBT
30
31
32 77 [code 180035910 and 180033210]. We also collected NDB data regarding ambulatory
33
34
35 78 psychotherapy as a reference (≥ 30 minutes [code 180012210] and < 30 minutes [code
36
37
38 79 180031010]). Ambulatory psychotherapy in the national health insurance scheme
39
40
41 80 includes any type of medical examination (e.g. supportive psychotherapy) implemented
42
43
44 81 by psychiatrists in routine outpatient care. We chose this as a reference to CBT because:
45
46
47 82 (1) both psychotherapies target only outpatients, and (2) both are provided only by a
48
49
50 83 medical doctor (table 1). Extracted NDB data provided the exact number of patients
51
52
53 84 who received each psychotherapy in each age group and prefecture. Each patient was
54
55
56 85 counted as "one" even though the patient received more than one session. We did not
57
58
59
60

collect diagnostic codes because it is said that diagnostic codes in NDB do not reflect the actual patient’s diagnosis due to insurance claims needs.[27] To address the uncertainty/inaccuracy of diagnostic codes in NDB, some studies have combined diagnostic codes with other reliable examination or treatment codes (e.g. breast cancer code + cancer treatment codes [surgery/chemotherapy/medication/radiation procedure]).[28] However, in the psychiatric field, diagnostic codes in NDB are usually based on clinicians' own judgement, and there are no other reliable examination or treatment codes to determine specific disorders. Therefore, we only focused on reliable medical practice codes in this study.

Table 1. CBT and ambulatory psychotherapy in Japan’s national health insurance scheme				
	CBT		Ambulatory psychotherapy	
	CBT(1) ^a	CBT(2)	≥ 30 min	< 30 min
Code	180035910	180033210	180012210	180031010
Time	> 30min		≥ 30 min	5-30 min
Provider	trained designated psychiatrist ^{b, c}	trained psychiatrist /clinician ^b	any psychiatrist	
Target	only mood disorder		any psychiatric disorder	
Institutional registration	+ ^d		-	

Medical fees per session (JPY)	5000	4200	4000	3300
Maximum of medical fees per hour (JPY)	10000	8400	8000	23100 ^e

^a CBT(1) have been established since FY2012.

^b who received some kind of any training for CBT.

^c Designated psychiatrist (Mental Health and Welfare Law-authorized) who also cooperates with local psychiatric emergency medical services (e.g. holiday/night medical examinations).

^d Institutions need to register their institution's name along with CBT providers names (trained designated psychiatrists or trained psychiatrists/clinicians) to the Regional Bureau of Health and Welfare of Japan.

^e assuming that a psychiatrist sees 7 patients per hour.[29]

CBT, cognitive behavioral therapy.

106

107 Analysis

108 Firstly, we calculated the change rate for the number of patients who received CBT or
109 ambulatory psychotherapy from FY2010 through FY2015. A baseline for the rate of
110 change for each psychotherapy was the number of patients in FY2010. Secondly, we

calculated the number of patients who received each psychotherapy per 100000 population, and then assessed the increase or decrease in patients between FY2010 and FY2015 by prefecture. Thirdly, we calculated the standardized claim ratio (SCR) for the number of patients who received CBT. The indicator is based on the same logic as the standardized mortality ratio (e.g. it signifies that a prefecture with an SCR over 100 has more patients who received CBT than the national mean). The SCR is calculated according to the following formula;

$$\begin{aligned} \text{SCR} &= \frac{\Sigma \text{ Observed number (N) of claims}}{\Sigma \text{ Expected N of claims}} \times 100 \\ &= \frac{\Sigma \text{ Observed N of claims by age group} \times 100}{\Sigma \text{ Population by age group} \times \text{ Claim rate by age group}} \\ &= \frac{\Sigma \text{ Observed N of claims by age group} \times 100}{\Sigma \text{ Population by age group} \times \frac{\text{Observed N of claims by age group in Japan}}{\text{Population by age group in Japan}}} \end{aligned}$$

Fourthly, in order to assess regional factors related to the provision of CBT, we examined associations between CBT patients per 100000 population and the following variables: (1) registered institutions for CBT per 100000 population from Regional Bureau of Health and Welfare of Japan; (2) psychiatrists per 100000 population from the portal site for Japanese Government Statistics, by using linear mixed effects models. Fixed effects were the above three variables and year; prefecture was included as a random effect. We also investigated the association between SCR for CBT and the implementation of formal CBT training (organized by the MHLW) using independent t-

test. The dependent variable was SCR for CBT, and the independent variables were prefecture groups that had been classified according to whether or not formal CBT training had been implemented (at least 1 time). P values < 0.05 were considered to indicate significant differences. Data were analyzed using the SAS software ver. 9.4 (SAS Institute Inc., Cary, NC, USA).

Patient and public involvement

Patients or public were not involved in this study.

Results

During the study period (FY2010–2015), 60304 patients received CBT and 34628225 patients received ambulatory psychotherapy. There is no big difference in terms of demographic data between these psychotherapies: more females than males received each psychotherapy, with most patients (male and female) being aged between 20–59 (see online supplementary table 1). As for trends over time (figure 1), the number of patients who received CBT dropped in FY2012 and thereafter recovered slightly from FY2013, but not to the level of FY2010 (when CBT was first added to the health insurance scheme). CBT patients decreased by 1.8% from FY2010 to FY2015. In

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

145 contrast, the number of patients who received both types of ambulatory psychotherapy
146 continued to increase; of these, ambulatory psychotherapy (≥ 30 min) increased
147 dramatically from FY2012.

148 *[Insert figure 1 about here]*

149 At the prefectural level, from FY2010 to FY2015, patients receiving CBT per
150 100000 population decreased (or remained at zero) in 32 of 47 prefectures, whereas
151 patients receiving ambulatory psychotherapy per 100000 population increased in all
152 prefectures. Figure 2 shows the SCR for the number of patients who received each
153 psychotherapy in the study period. There was a maximum 424.7-fold difference in SCR
154 between the highest (SCR = 585.2 in Ishikawa) and lowest (SCR = 1.4 in Tokushima)
155 prefectures. Meanwhile, there was a maximum 3.4-fold difference in SCR of
156 ambulatory psychotherapy (see online supplementary table 2).

157 *[Insert figure 2 about here]*

158 In terms of the relationship between regional factors and the provision of CBT,
159 the number of patients who received CBT per 100000 population was associated
160 significantly with the number of registered CBT institutions per 100000 population ($p <$
161 0.01) (table 2). If the number of registered institutions per 100000 population increased
162 by one, the number of patients increased by 23.1 (standard error = 3.4) patients per

100000 population. The other factors were not associated with the number of CBT patients per 100000 population or SCR for CBT (table 2 and 3).

Table 2. Results of ecological analysis on factors associated with number of patients who received CBT per 100000 population (FY2010–2015)

		Estimate	Standard error	Degree of freedom	T value	P value
Number of registered CBT institutions per 100 000 population	Intercept	-5.0	2.6	46	-1.9	0.06
	Slope	23.1	3.4	137	6.7	< 0.01*
Number of psychiatrists per 100 000 population	Intercept	4.4	5.9	46	0.7	0.46
	Slope	0.3	0.4	91	0.6	0.52

* indicates significant difference.

CBT, cognitive behavioral therapy.

Table 3. Association between implementation of formal CBT training and SCR for CBT (FY2010–FY2015)

	Training [-]	Training [+]	P value
Prefectures (n)	37	10	-
SCR for CBT (Mean \pm SE)	98.0 \pm 23.0	73.2 \pm 19.9	0.59

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

169 Degree of freedom = 45, t value = 0.54.

170 CBT, cognitive behavioral therapy; SCR, standardized claim ratio.

171

172 **DISCUSSION**

173 This is the first study to use the nationwide claim database to demonstrate in detail the
174 provision status of CBT in Japan in the first six years (FY2010–2015) after its inclusion
175 in the national health insurance scheme. Our results show that: (a) approximately 60000
176 patients received CBT during the study period; (b) the number of patients receiving
177 CBT was highest in the first year (-1.8% from FY2010 to FY2015), whereas
178 ambulatory psychotherapies continued to increase over six years (+121.3% [≥ 30 min]
179 and +17.7% [< 30 min] from FY2010 to FY2015); (c) the number of patients receiving
180 CBT per 100000 decreased (or remained at zero) in most prefectures (32 out of 47); (d)
181 based on SCR, there was a maximum 420-fold regional difference in the number of
182 CBT patients between prefectures; (e) the number of registered CBT institutions was
183 significantly associated with the number of patients receiving CBT. Overall, the current
184 study indicates that the provision of CBT did not increase under Japan’s health
185 insurance scheme from FY2010 to FY2015.

1
2
3
4
5 186 The reasons that the provision of CBT reached a plateau in Japan could be due
6
7
8 187 to strict requirements and low medical fees for therapists/institutions in the national
9
10
11 188 health insurance system. For example, a CBT provider must be a medical doctor, must
12
13
14 189 target only mood disorders, and the provider's institution must be registered to the
15
16
17 190 Regional Bureau of Health and Welfare of Japan (table 1). Because CBT is only
18
19
20 191 allowed to treat mood disorders, one would reasonably expect ambulatory
21
22
23 192 psychotherapy to be provided at a higher rate than CBT. In terms of medical fees, CBT
24
25
26 193 fees in Japan are substantially lower than those in Western countries (e.g. Japan,
27
28
29 194 maximum 5000 JPY per session; in contrast, in the UK, 97 GBP [equal to 14550 JPY]
30
31
32 195 per session[30]). Moreover, CBT fees are almost the same as ambulatory psychotherapy
33
34
35 196 fees for sessions over 30 minutes despite the aforementioned restrictions (table 1). Thus,
36
37
38 197 ambulatory psychotherapy sessions under 30 minutes yield the highest profits for
39
40
41 198 clinicians in Japan's national health insurance system. Indeed, Japanese psychiatrists
42
43
44 199 see 7 outpatients per hour in routine clinical practice.[29] Furthermore, some studies
45
46
47 200 have reported that the main obstacles in providing psychotherapy/CBT in Japan are a
48
49
50 201 lack of time and profitability.[24 25] Thus, more reasonable medical fees and
51
52
53 202 requirements suitable to the actual conditions of routine clinical practice could motivate
54
55
56 203 the use of CBT under the national health insurance scheme in Japan.
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

204 This study focused on CBT but a large shift in ambulatory psychotherapy (≥ 30
205 min) in FY2012 should be addressed. It seems that this large shift was caused by the
206 revision of medical fee requirements for ambulatory psychotherapy in that year. Before
207 the revision in FY2012, psychiatrists at any psychiatric institution were able to claim
208 one type of ambulatory psychotherapy when they spent more than 60 minutes with a
209 patient for the first visit. However, the revision imposed cooperation with local
210 psychiatric emergency medical services (e.g. holiday/night medical examinations) on
211 psychiatrist for this type of ambulatory psychotherapy. Because of this, many
212 psychiatrists (especially those working at small psychiatric institutions) were no longer
213 able to claim the optional fees for ambulatory psychotherapy applied on the first visit.
214 As a result, it is possible that psychiatrists started claiming outpatients in the first visit
215 as covered by "ambulatory psychotherapy (≥ 30 min)".

216 Our results also showed a maximum approximately 420-fold difference in SCR
217 for CBT between prefectures, and a maximum 3.4-fold difference in SCR for
218 ambulatory psychotherapy. Namely, there was a large regional variation in CBT
219 utilization. In particular, SCR was low over the whole Tohoku region where effective
220 treatment for psychiatric disorders is in high demand because of the high suicide
221 rate.[31] In contrast, SCR in some prefectures (e.g. Ishikawa, Shimane, Gifu, Okayama,

1
2
3
4
5 222 Kumamoto) was noticeably high. Investigation into CBT efforts in these areas would be
6
7
8 223 helpful to fill in the gaps in regional variations in providing CBT. On the other hand,
9
10
11 224 one of the reasons for the large variation in SCR between prefectures may be that the
12
13
14 225 total number of CBT patients in Japan is small. Therefore, if a single institution in a
15
16
17 226 particular prefecture has many CBT patients, the SCR in that area would be
18
19
20 227 overestimated because it is an indicator calculated from the national mean.
21
22

23 228 During the study period, formal CBT training had been implemented in 10 out
24
25
26 229 of 47 prefectures. We predicted that the implementation of formal CBT training would
27
28
29 230 be associated with SCR for CBT, but there was no association between these variables.
30
31
32 231 The training consists of a two-day onsite workshop and continuous online clinical
33
34
35 232 supervision. Thus, one of the reasons that clinicians in regions with no workshop
36
37
38 233 training can continue to provide CBT may be because they can receive continuous
39
40
41 234 online supervised instruction irrespective of area. There was also a significant
42
43
44 235 association between the number of CBT patients per 100 000 population and the number
45
46
47 236 of registered CBT institutions per 100 000 population. These results suggest that an
48
49
50 237 increase in institutions that have formally-trained clinicians and that meet institutional
51
52
53 238 criteria for CBT could lead to a wide-scale dissemination of CBT under the national
54
55
56 239 health insurance scheme.
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

240 In order to make CBT much more widely available, recent success in the UK
241 also offer lessons that are likely applicable to Japan. The UK government has instigated
242 a therapists' post-qualification training program, the English Improving Access to
243 Psychological Therapies (IAPT). Since the start of the IAPT in 2008, the number of
244 patients who receive psychotherapy in the UK has increased (over 560000 patients
245 received a course of treatment in 2017).[32] Because both the UK and Japan have a
246 universal healthcare system, such financial and logistical supports from health care
247 policymakers are crucial for a wide-scale implementation of CBT in Japan.

248 The strength of this study is that the data source was the NDB, a
249 comprehensive database which covers all electronic claims in Japan's national health
250 insurance system. However, there are also several limitations. First, the NDB does not
251 store medical treatment data for any treatment provided outside the national system (e.g.
252 private counseling). Although CBT for depression in Japan is mainly provided by
253 psychologists in routine care,[33] it is not covered by the national health insurance
254 system. Thus, there is a possibility that more CBT was actually conducted across Japan,
255 even in prefectures with few CBT patients under the health insurance scheme. Second,
256 we selected ambulatory psychotherapy as a reference to CBT because both
257 psychotherapies target only outpatients and both are provided only by a medical doctor.

1
2
3
4
5 258 However, this is still not an ideal reference because the provider and target of both
6
7
8 259 psychotherapies are not perfect analogs. Third, our ecological analysis was conducted
9
10
11 260 using specific variables. There could be other factors which affect the provision of CBT.
12
13
14 261 Because of these limitations, a further questionnaire survey of registered CBT
15
16
17 262 institutions is required.
18

19
20 263 Overall, our current study revealed some issues regarding the provision of CBT
21
22
23 264 in Japan in the first six years (FY2010–FY2015) after its coverage in the national health
24
25
26 265 insurance scheme. The number of patients receiving CBT in Japan did not increase
27
28
29 266 probably due to unprofitability for therapists/institutions in Japan's current healthcare
30
31
32 267 insurance system. Further, there were large regional variations in CBT status between
33
34
35 268 the 47 prefectures and a significant association between the number of CBT patients per
36
37
38 269 100000 population and the number of registered CBT institutions per 100000
39
40
41 270 population. These findings suggest that an appropriate evaluation of medical fees for
42
43
44 271 CBT in clinical settings and supporting hospitals and/or clinics in meeting the
45
46
47 272 institutional criteria for CBT would help in the widespread utilization of CBT in Japan.
48
49
50 273 Further research into the status of CBT in Japan after the observation period of this
51
52
53 274 study (FY2016–) and a questionnaire survey of registered CBT institutions are required
54
55
56 275 to get more detailed information on the dissemination of CBT.
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

276

277

278

279

280

281

282

283

284

285

286

287

288

289

290

291

292

293

Acknowledgements: The authors are grateful to Mr. Richard White for checking the English, and to Ms. Chieko Fujiyama for supporting data collection and entry.

Author Contributions: Conception and design of the study: YH, NY, HT, KY, YK, YA, TY, and YI; Acquisition of data: YH and NY; Analysis and interpretation of data: YH, NY, YS, HT, KY, YK, YA, TY, and YI; Drafting the manuscript: YH, NY, and YS. All authors critically reviewed the manuscript and approved of the final version.

Funding: This work was supported by a FY2017 (21th) research grant for young researchers from the Japanese Institute for Health Economics and Policy (<https://www.ihep.jp>) (to NY).

Competing interests: NY has received a speaking honorarium from Gakken Medical Support, and writing honoraria from Igaku Shoin, Nihon-Hyouronsha, Sogensha, and Medical Friend. The other authors declare that they have no conflicts of interest.

Patients consent for publication: Not required.

294

295 **Ethics approval:** The study protocol was reviewed and approved by the Ethics
296 Committee of the University of Miyazaki (reference number: O-0017). We also got
297 permission to use a dataset extracted from the NDB (reference number: 1025-1).
298 Written informed consent was waived because all patient records were automatically
299 anonymized prior to storage in NDB (i.e. no one can identify specific patients).

300

301 **Provenance and peer review:** Not commissioned; externally peer reviewed.

302

303 **Data sharing statement:** No additional data are available.

REFERENCES

1. Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Med* 2006;3:e442 doi:10.1371/journal.pmed.0030442 [published Online First: 30 November 2006].

2. Butler AC, Chapman JE, Forman EM, et al. The empirical status of cognitive-behavioral therapy: a review of meta-analyses. *Clin Psychol Rev* 2006;26:17-31 doi:10.1016/j.cpr.2005.07.003 [published Online First: 4 October 2005].

3. Sado M, Knapp M, Yamauchi K, et al. Cost-effectiveness of combination therapy versus antidepressant therapy for management of depression in Japan. *Aust N Z J Psychiatry* 2009;43:539-47 doi:10.1080/00048670902873664 [published Online First: 15 May 2009].

4. Fujisawa D, Nakagawa A, Tajima M, et al. Cognitive behavioral therapy for depression among adults in Japanese clinical settings: a single-group study. *BMC Res Notes* 2010;3:160 doi:10.1186/1756-0500-3-160.

5. Cuijpers P, Berking M, Andersson G, et al. A meta-analysis of cognitive-behavioural therapy for adult depression, alone and in comparison with other treatments. *Can J Psychiatry* 2013;58:376-85 doi:10.1177/070674371305800702 [published Online First: 23 July 2013].

- 1
2
3
4
5 323 6. Wiles N, Thomas L, Abel A, et al. Cognitive behavioural therapy as an adjunct to
6
7
8 324 pharmacotherapy for primary care based patients with treatment resistant
9
10
11 325 depression: results of the CoBaT randomised controlled trial. *Lancet*
12
13
14 326 2013;381:375-84 doi:10.1016/s0140-6736(12)61552-9 [published Online First: 12
15
16
17 327 December 2012].
18
19
20 328 7. Nakagawa A, Mitsuda D, Sado M, et al. Effectiveness of Supplementary Cognitive-
21
22
23 329 Behavioral Therapy for Pharmacotherapy-Resistant Depression: A Randomized
24
25
26 330 Controlled Trial. *J Clin Psychiatry* 2017;78:1126-35 doi:10.4088/JCP.15m10511
27
28
29 331 [published Online First: 3 March 2017].
30
31
32 332 8. Takagaki K, Okamoto Y, Jinnin R, et al. Enduring effects of a 5-week behavioral
33
34
35 333 activation program for subthreshold depression among late adolescents: an
36
37
38 334 exploratory randomized controlled trial. *Neuropsychiatr Dis Treat* 2018;14:2633-
39
40
41 335 41 doi:10.2147/NDT.S172385 [published Online First: 24 October 2018].
42
43
44 336 9. Mavranetzouli I, Mayo-Wilson E, Dias S, et al. The Cost Effectiveness of
45
46
47 337 Psychological and Pharmacological Interventions for Social Anxiety Disorder: A
48
49
50 338 Model-Based Economic Analysis. *PLoS One* 2015;10:e0140704
51
52
53 339 doi:10.1371/journal.pone.0140704 [published Online First: 28 October 2015].
54
55
56
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

340 10. Sava FA, Yates BT, Lupu V, et al. Cost-effectiveness and cost-utility of cognitive
341 therapy, rational emotive behavioral therapy, and fluoxetine (Prozac) in treating
342 depression: a randomized clinical trial. *J Clin Psychol* 2009;65:36-52
343 doi:10.1002/jclp.20550 [published Online First: 4 December 2008].

344 11. National Institute for Clinical Excellence (NICE). Clinical guidelines [CG90].
345 Depression in adults: recognition and management. 2009
346 www.nice.org.uk/guidance/cg90 (accessed 20 Dec 2017).

347 12. American Psychiatric Association (APA). Practice guideline for the treatment of
348 patients with acute stress disorder and posttraumatic stress disorder second edition.
349 2010
350 www.psychiatryonline.org/pb/assets/raw/sitewide/practice_guidelines/guidelines/pa
351 nicdisorder.pdf (accessed 20 Dec 2017).

352 13. Hay P, Chinn D, Forbes D, et al. Royal Australian and New Zealand College of
353 Psychiatrists clinical practice guidelines for the treatment of eating disorders. *Aust*
354 *N Z J Psychiatry* 2014;48:977-1008 doi:10.1177/0004867414555814 [published
355 Online First: 30 October 2014].

356 14. Parikh SV, Quilty LC, Ravitz P, et al. Canadian Network for Mood and Anxiety
357 Treatments (CANMAT) 2016 Clinical Guidelines for the Management of Adults

- with Major Depressive Disorder: Section 2. Psychological Treatments. *Can J Psychiatry* 2016;61:524-39 doi:10.1177/0706743716659418 [published Online First: 4 August 2016].
15. Japanese Society of Mood Disorders. Guideline for treatment of major depressive disorder. 2016 www.secretariat.ne.jp/jsmd/mood_disorder/img/160731.pdf [in Japanese] (accessed 20 Dec 2017).
16. McHugh RK, Whitton SW, Peckham AD, et al. Patient preference for psychological vs pharmacologic treatment of psychiatric disorders: a meta-analytic review. *J Clin Psychiatry* 2013;74:595-602 doi:10.4088/JCP.12r07757 [published Online First: 12 July 2013].
17. Dwight-Johnson M, Sherbourne CD, Liao D, et al. Treatment preferences among depressed primary care patients. *J Gen Intern Med* 2000;15:527-34 doi:10.1046/j.1525-1497.2000.08035.x [published Online First: 12 August 2000].
18. Shafran R, Clark DM, Fairburn CG, et al. Mind the gap: Improving the dissemination of CBT. *Behav Res Ther* 2009;47:902-9 doi:10.1016/j.brat.2009.07.003 [published Online First: 12 August 2009].
19. Gunter RW, Whittal ML. Dissemination of cognitive-behavioral treatments for anxiety disorders: Overcoming barriers and improving patient access. *Clin Psychol*

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

376 *Rev* 2010;30:194-202 doi:10.1016/j.cpr.2009.11.001 [published Online First: 28
377 November 2009].

378 20. Ono Y, Furukawa TA, Shimizu E, et al. Current status of research on cognitive
379 therapy/cognitive behavior therapy in Japan. *Psychiatry Clin. Neurosci*
380 2011;65:121-9 doi:10.1111/j.1440-1819.2010.02182.x [published Online First: 19
381 March 2011].

382 21. International Narcotics Control Board. Report of the International Narcotics
383 Control Board on the Availability of Internationally Controlled Drugs: Ensuring
384 Adequate Access for Medical and Scientific Purposes. 2010
385 www.incb.org/documents/Publications/AnnualReports/AR2010/Supplement-
386 AR10_availability_English.pdf (accessed 20 Dec 2017).

387 22. Yoshio T. The trend for megadose polypharmacy in antipsychotic
388 pharmacotherapy: a prescription survey conducted by the psychiatric clinical
389 pharmacy research group. *Seishin Shinkeigaku Zasshi* 2012;114:690-95 [in
390 Japanese].

391 23. Okumura Y, Shimizu S, Matsumoto T. Prevalence, prescribed quantities, and
392 trajectory of multiple prescriber episodes for benzodiazepines: A 2-year cohort

- study. *Drug Alcohol Depend* 2016;158:118-25
doi:10.1016/j.drugalcdep.2015.11.010.
24. Fujisawa D, Nakagawa A, Sado M, et al. Current status and dissemination of
psychotherapies in Japan. Japan Ministry of Health and Labor 2006 [in Japanese].
25. Takahashi F, Takegawa S, Okumura Y, et al. Actual condition survey on the
implementation of Cognitive Behavioral Therapy at psychiatric clinics in Japan.
2018 [www.ftakalab.jp/wordpress/wp-](http://www.ftakalab.jp/wordpress/wp-content/uploads/2011/08/japancbtclinic_report.pdf)
[content/uploads/2011/08/japancbtclinic_report.pdf](http://www.ftakalab.jp/wordpress/wp-content/uploads/2011/08/japancbtclinic_report.pdf) [in Japanese] (accessed 9 Jan
2018).
26. Japanese Ministry of Health, Labour and Welfare. Status of dissemination of
electronically submitted claims. 2015 [www.mhlw.go.jp/file/06-Seisakujouhou-](http://www.mhlw.go.jp/file/06-Seisakujouhou-12400000-Hokenkyoku/0000099002.pdf)
[12400000-Hokenkyoku/0000099002.pdf](http://www.mhlw.go.jp/file/06-Seisakujouhou-12400000-Hokenkyoku/0000099002.pdf) [in Japanese] (accessed 20 Dec 2017).
27. Nakayama T, Imanaka Y, Okuno Y, et al. Analysis of the evidence-practice gap to
facilitate proper medical care for the elderly: investigation, using databases, of
utilization measures for National Database of Health Insurance Claims and Specific
Health Checkups of Japan (NDB). *Environ Health Prev Med* 2017;22
doi:10.1186/s12199-017-0644-5

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

410 28. Sato I, Yagata H, Ohashi Y. The Accuracy of Japanese Claims Data in Identifying
411 Breast Cancer Cases. *Biol. Pharm. Bull* 2015;38:53-7.

412 29. Nakagawa A, Williams A, Sado M, et al. Comparison of treatment selections by
413 Japanese and US psychiatrists for major depressive disorder: A case vignette study.
414 *Psychiatry Clin. Neurosci* 2015;69:553-62. doi:10.1111/pcn.12273 [published
415 Online First: 21 Jan 2015].

416 30. Curtis L, Burns A. Unit Costs of Health and Social Care 2016, Personal Social
417 Services Research Unit. Canterbury: University of Kent 2016
418 www.pssru.ac.uk/project-pages/unit-costs/unit-costs-2016/ (accessed 20 Dec 2017).

419 31. Japanese Ministry of Health, Labour and Welfare. Number of suicide based on
420 statistics report by National Police Agency. 2019
421 www.mhlw.go.jp/content/201812-sokuhou.pdf [in Japanese] (accessed 25 Jan
422 2019).

423 32. Clark DM. Realizing the Mass Public Benefit of Evidence-Based Psychological
424 Therapies: The IAPT Program. *Annu Rev Clin Psychol* 2018;14:159-83
425 doi:10.1146/annurev-clinpsy-050817-084833.

- 1
2
3
4
5 426 33. Sato H, Tanno Y. The Effect of Cognitive Behavioral Therapy for Depression
6
7
8 427 Delivered by Japanese Psychologists : A Systematic Review. *Japanese journal of*
9
10
11 428 *behavior therapy* 2012;38:157-67 [in Japanese].
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

For peer review only

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

429 **Figure legends:**

430 **Figure 1.** Trends over time for the number of outpatients who received
431 psychotherapy in Japan.

432 **Figure 2.** Geographical distribution of standardized claim ratio (SCR) for the
433 number of outpatients who received psychotherapy in Japan from FY2010 to
434 FY2015. The color bar shows a degree of SCR. SCR of 100 indicates the
435 national mean.

Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.
Erasmushogeschool

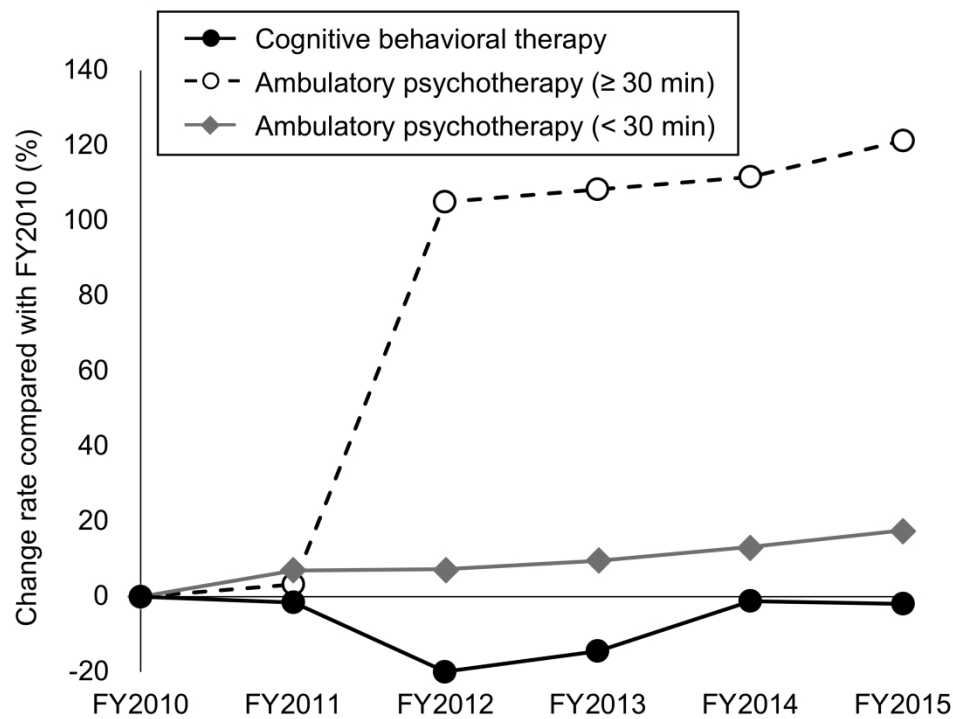


Figure 1. Trends over time for the number of outpatients who received psychotherapy in Japan. FY, fiscal year.

254x190mm (300 x 300 DPI)

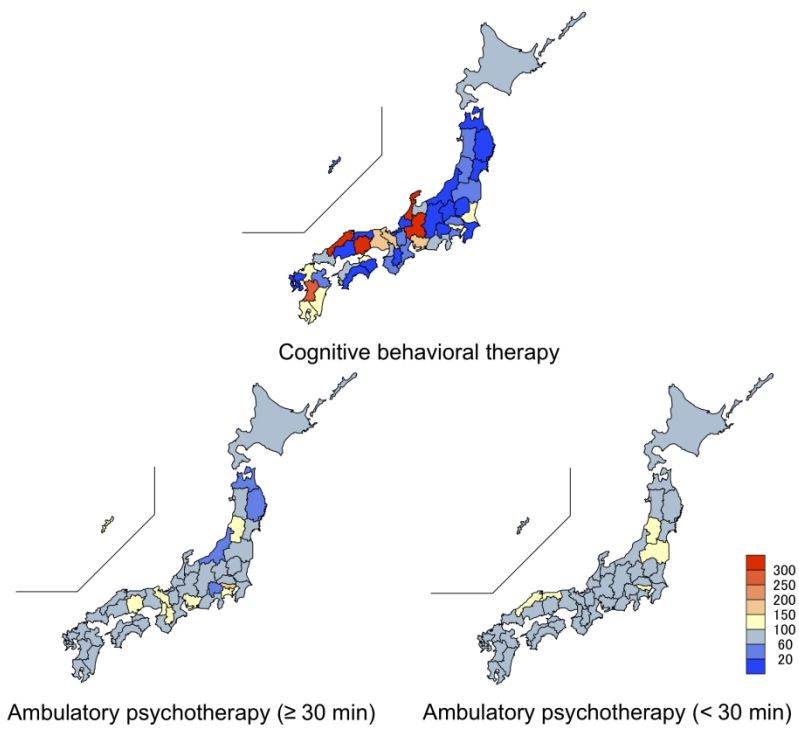
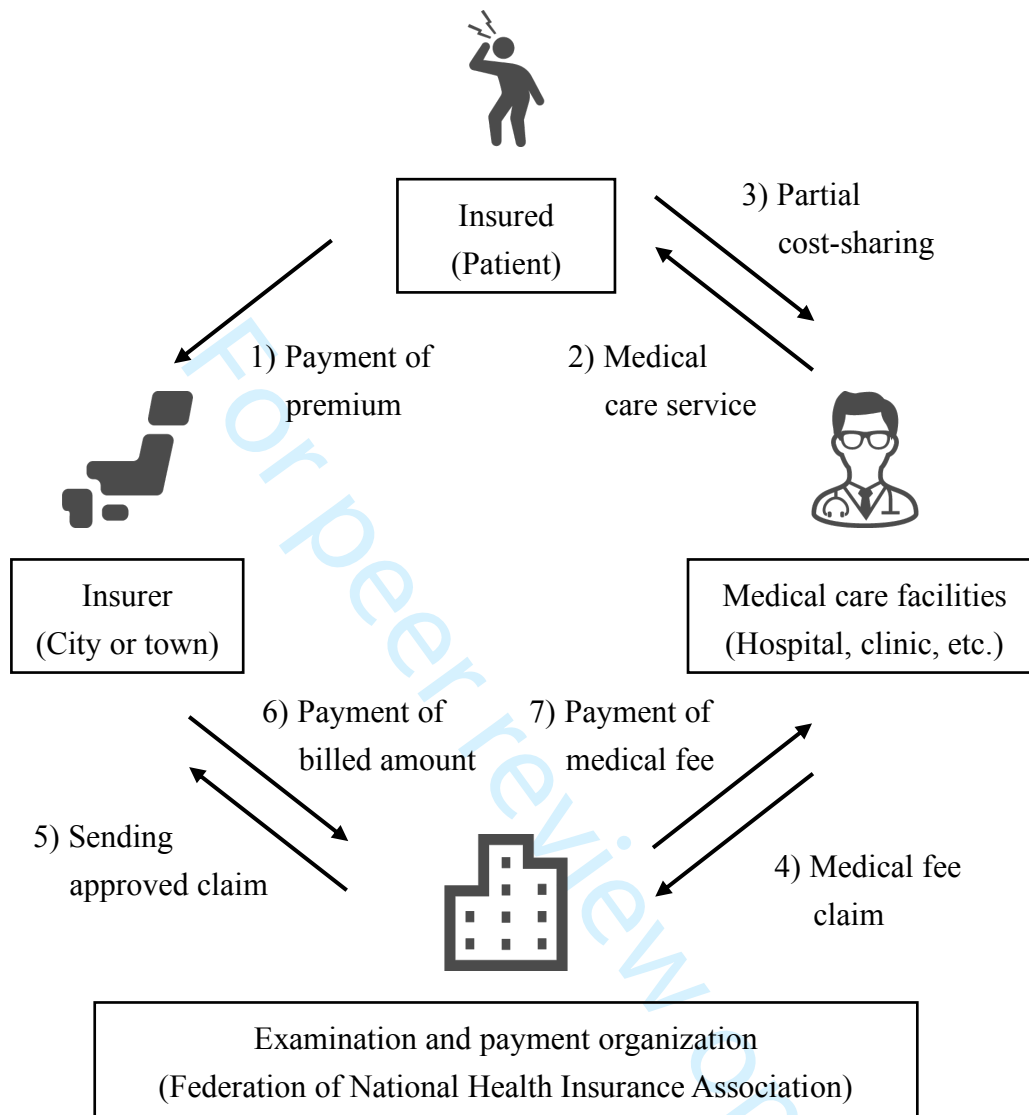


Figure 2. Geographical distribution of standardized claim ratio (SCR) for the number of outpatients who received psychotherapy in Japan from fiscal years 2010 to 2015. The color bar shows a degree of SCR. SCR of 100 indicates the national mean.

254x190mm (300 x 300 DPI)

Supplementary Figure 1. Overview of Japan's universal healthcare system



Supplementary Table 1. Demographic data of outpatients who received each psychotherapies by sex and age groups

	FY2010						FY2011					
	Ambulatory psychotherapy						Ambulatory psychotherapy					
	CBT	%					CBT	%				
			≥ 30 min	%	< 30 min	%			≥ 30 min	%	< 30 min	%
Male (years)	3911	34.9	266900	40.4	1979923	42.6	3896	35.5	279000	40.8	2135354	42.9
0-9	13	0.1	24510	3.7	34028	0.7	87	0.8	26480	3.9	37825	0.8
10-19	135	1.2	33955	5.1	85966	1.9	230	2.1	35715	5.2	95109	1.9
20-29	660	5.9	39449	6.0	231457	5.0	648	5.9	41733	6.1	242586	4.9
30-39	1027	9.2	52128	7.9	429146	9.2	931	8.5	52961	7.8	447328	9.0
40-49	900	8.0	43379	6.6	418062	9.0	821	7.5	45867	6.7	457105	9.2
50-59	451	4.0	25776	3.9	298054	6.4	426	3.9	26776	3.9	321345	6.5
60-69	304	2.7	18412	2.8	225926	4.9	270	2.5	18563	2.7	252745	5.1
70-79	233	2.1	17154	2.6	165747	3.6	254	2.3	17855	2.6	180096	3.6
≥ 80	188	1.7	12137	1.8	91537	2.0	229	2.1	13050	1.9	101215	2.0
Female (years)	7285	65.1	393585	59.6	2662976	57.4	7084	64.5	404249	59.2	2839696	57.1
0-9	-*	-*	8532	1.3	11131	0.2	27	0.2	9415	0.4	12570	0.3
10-19	240	2.1	35604	5.4	90061	1.9	314	2.9	35701	5.2	92282	1.9
20-29	1435	12.8	73045	11.1	349509	7.5	1475	13.4	73823	10.8	356484	7.2
30-39	1821	16.3	82301	12.5	496888	10.7	1684	15.3	82397	12.1	515329	10.4
40-49	1317	11.8	59671	9.0	432489	9.3	1187	10.8	63124	9.2	471593	9.5
50-59	745	6.7	37629	5.7	341547	7.4	640	5.8	38391	5.6	360082	7.2
60-69	596	5.3	33855	5.1	362120	7.8	570	5.2	34571	5.1	400893	8.1
70-79	607	5.4	34972	5.3	337177	7.3	573	5.2	36171	5.3	363038	7.3
≥80	524	4.7	27976	4.2	242054	5.2	614	5.6	30656	4.5	267425	5.4
Total	11196	100.0	660485	100.0	4642899	100.0	10980	100.0	683249	100.0	4975050	100.0

	FY2012						FY2013					
	Ambulatory						Ambulatory					
	CBT	%	psychotherapy				CBT	%	psychotherapy			
			≥ 30 min	%	< 30 min	%			≥ 30 min	%	< 30 min	%
Male (years)	3076	34.6	560242	42.1	2165896	43.2	3335	35.1	569291	42.0	2219842	43.2
0-9	38	0.4	35832	2.7	42067	0.8	87	0.9	39511	2.9	44852	0.9
10-19	205	2.3	56679	4.3	101667	2.0	289	3.0	62003	2.6	110685	2.2
20-29	596	6.7	96743	7.3	241561	4.8	634	6.7	97146	2.2	242685	4.7
30-39	820	9.2	117335	8.8	434811	8.7	791	8.3	114192	8.4	429615	8.4
40-49	669	7.5	101404	7.6	472920	9.4	707	7.4	103653	7.6	493436	9.6
50-59	361	4.1	56336	4.2	324168	6.5	358	3.8	58176	4.3	339876	6.6
60-69	132	1.5	35539	2.7	249642	5.0	165	1.7	34569	2.5	252337	4.9
70-79	123	1.4	33967	2.6	184434	3.7	159	1.7	33671	2.5	186195	3.6
≥ 80	132	1.5	26407	2.0	114626	2.3	145	1.5	26370	1.9	120161	2.3
Female (years)	5807	65.4	771408	57.9	2850916	56.8	6168	64.9	786834	58.0	2912985	56.8
0-9	13	0.1	12801	1.0	13991	0.3	32	0.3	14292	1.1	14791	0.3
10-19	327	3.7	58361	4.4	90174	1.8	334	3.5	61544	4.5	92688	1.8
20-29	1341	15.1	152412	11.4	342357	6.8	1331	14.0	153488	11.3	340023	6.6
30-39	1494	16.8	155592	11.7	497402	9.9	1445	15.2	155481	11.5	496462	9.7
40-49	1096	12.3	122844	9.2	487840	9.7	1198	12.6	129208	9.5	516329	10.1
50-59	584	6.6	73272	5.5	358659	7.1	673	7.1	76207	5.6	372409	7.3
60-69	360	4.1	64996	4.9	391051	7.8	397	4.2	65076	4.8	392264	7.6
70-79	294	3.3	69522	5.2	367981	7.3	374	3.9	69623	5.1	372923	7.3
≥80	298	3.4	61608	4.6	301461	6.0	384	4.0	61915	4.6	315096	6.1
Total	8883	100.0	1331650	100.0	5016812	100.0	9503	100.0	1356125	100.0	5132827	100.0

	FY2014						FY2015					
	Ambulatory psychotherapy						Ambulatory psychotherapy					
	CBT	%					CBT	%				
			≥ 30 min	%	< 30 min	%			≥ 30 min	%	< 30 min	%
Male (years)	3875	35.3	586888	42.6	2300881	43.5	3865	35.3	622021	43.1	2403172	43.7
0-9	33	0.3	43989	3.2	50390	1.0	40	0.4	47545	3.3	57976	1.1
10-19	349	3.2	64301	4.7	119572	2.3	413	3.8	71046	4.9	134036	2.4
20-29	689	6.3	99072	7.2	248292	4.7	781	7.1	106333	7.4	260323	4.7
30-39	963	8.8	113575	8.2	427762	8.1	894	8.2	115858	8.0	427604	7.8
40-49	791	7.2	107432	7.8	517169	9.8	757	6.9	112828	7.8	539896	9.8
50-59	458	4.2	61797	4.5	361529	6.8	427	3.9	67209	4.7	386159	7.0
60-69	206	1.9	35107	2.5	258163	4.9	224	2.0	36744	2.5	267293	4.9
70-79	202	1.8	33992	2.5	191525	3.6	194	1.8	35160	2.4	195045	3.6
≥ 80	184	1.7	27623	2.0	126479	2.4	135	1.2	29298	2.0	134840	2.5
Female (years)	7095	64.7	791424	57.4	2992615	56.5	7077	64.7	819723	56.9	3090963	56.3
0-9	21	0.2	15395	1.1	16580	0.3	25	0.2	16761	1.2	18807	0.3
10-19	427	3.9	61191	4.4	95814	1.8	499	4.6	67150	4.7	103448	1.9
20-29	1390	12.7	150502	10.9	338609	6.4	1398	12.8	154718	10.7	344264	6.3
30-39	1568	14.3	152600	11.1	494340	9.3	1533	14.0	152159	10.6	494355	9.0
40-49	1528	13.9	133540	9.7	545860	10.3	1636	15.0	139034	9.6	573414	10.4
50-59	779	7.1	79907	5.8	393351	7.4	830	7.6	85473	5.9	416398	7.6
60-69	432	3.9	63576	4.6	394986	7.5	373	3.4	65256	4.5	400465	7.3
70-79	467	4.3	70617	5.1	383780	7.3	399	3.6	71180	4.9	389717	7.1
≥80	483	4.4	64096	4.7	329295	6.2	384	3.5	67992	4.7	350095	6.4
Total	10970	100.0	1378312	100.0	5293496	100.0	10942	100.0	1441744	100.0	5494135	100.0

*Number of patients less than 10 people were noted as zero (-) in order to prevent unwanted identification of personal information.

Abbreviation: CBT, cognitive behavioral therapy.

Supplementary Table 2. Standardized claim ratio of outpatients who received each psychotherapies by prefecture

Prefecture	CBT	Ambulatory psychotherapy	
		≥ 30 min	< 30 min
Japan	reference*	reference*	reference*
Hokkaido	63.8	74.5	94.7
Aomori	8.7	51.7	82.1
Iwate	8.6	57.8	88.5
Miyagi	19.7	97.5	88.3
Akita	29.0	99.4	90.3
Yamagata	51.8	118.3	106.3
Fukushima	29.7	89.0	102.6
Ibaraki	138.9	60.7	71.4
Tochigi	13.9	60.7	85.0
Gunma	18.9	98.0	91.7
Saitama	42.9	68.8	77.1
Chiba	15.5	73.0	87.6
Tokyo	144.2	176.2	118.7
Kanagawa	47.8	108.2	92.2
Niigata	11.3	57.3	96.0
Toyama	60.5	66.4	85.8
Ishikawa	585.2	71.1	89.2
Fukui	1.9	81.3	97.6
Yamanashi	14.6	57.4	71.8
Nagano	5.7	95.2	97.2
Gifu	388.0	86.9	78.9
Shizuoka	75.1	70.1	83.1
Aichi	153.5	116.7	88.3
Mie	56.2	94.9	87.8
Shiga	54.6	78.6	80.2
Kyoto	193.6	118.1	82.8
Osaka	97.9	103.9	89.3
Hyogo	173.8	90.2	89.4
Nara	5.5	100.0	80.3
Wakayama	32.9	80.3	83.5
Tottori	18.4	69.1	100.3
Shimane	483.8	84.2	117.6
Okayama	352.9	117.2	97.3

Hiroshima	18.9	82.3	94.4
Yamaguchi	61.6	84.8	93.5
Tokushima	1.4	90.2	89.4
Kagawa	115.2	88.4	86.7
Ehime	78.9	74.3	96.0
Kochi	3.2	80.0	90.9
Fukuoka	115.0	97.7	81.8
Saga	1.8	76.3	80.0
Nagasaki	5.5	81.2	91.4
Kumamoto	251.2	90.9	84.9
Oita	43.4	80.7	83.5
Miyazaki	118.6	90.7	84.0
Kagoshima	103.4	79.7	75.3
Okinawa	40.4	137.3	93.4

*Standardized claim ratio of 100 indicates national mean (reference).

Abbreviation: CBT, cognitive behavioral therapy.

BMJ Open

How was cognitive behavioral therapy for mood disorder implemented in Japan?: a retrospective observational study using the nationwide claims database from FY2010 to FY2015

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2019-033365.R1
Article Type:	Original research
Date Submitted by the Author:	27-Jan-2020
Complete List of Authors:	Hayashi, Yuta; University of Miyazaki, Graduate School of Medicine and Veterinary Medicine Yoshinaga, Naoki; University of Miyazaki, School of Nursing, Faculty of Medicine Sasaki, Yosuke; University of Miyazaki, Department of Animal and Grassland Sciences, Faculty of Agriculture; University of Miyazaki, Center for Animal Disease Control Tanoue, Hiroki; University of Miyazaki, Graduate School of Medicine and Veterinary Medicine; University of Miyazaki, School of Nursing, Faculty of Medicine Yoshimura, Kensuke; Chiba University Hospital, Health Care Management Center Kadowaki, Yuko; University of Miyazaki Hospital, Clinical Research Support Center Arimura, Yasuji; University of Miyazaki Hospital, Clinical Research Support Center Yanagita, Toshihiko; University of Miyazaki, School of Nursing, Faculty of Medicine; University of Miyazaki Hospital, Clinical Research Support Center Ishida, Yasushi; University of Miyazaki, Division of Psychiatry, Department of Clinical Neuroscience, Faculty of Medicine
Primary Subject Heading:	Mental health
Secondary Subject Heading:	Epidemiology
Keywords:	cognitive behavioral therapy, database, national health insurance, Japan, MENTAL HEALTH

SCHOLARONE™
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.
Erasmus Hogeschool

Title of article:

How was cognitive behavioral therapy for mood disorder implemented in Japan?: a retrospective observational study using the nationwide claims database from FY2010 to FY2015

Corresponding author:

Naoki Yoshinaga, School of Nursing, Faculty of Medicine, University of Miyazaki, 5200 Kihara, Kiyotake, Miyazaki 889-1692, Japan. E-mail: naoki-y@med.miyazaki-u.ac.jp Tel/Fax: (+81)985-85-9784

Authors:

Yuta Hayashi,¹ Naoki Yoshinaga,² Yosuke Sasaki,^{3,4} Hiroki Tanoue,^{1,2} Kensuke Yoshimura,⁵ Yuko Kadowaki,⁶ Yasuji Arimura,⁶ Toshihiko Yanagita,^{2,6} Yasushi Ishida⁷

¹ Graduate School of Medicine and Veterinary Medicine, University of Miyazaki, Miyazaki, Japan

² School of Nursing, Faculty of Medicine, University of Miyazaki, Miyazaki, Japan

³ Department of Animal and Grassland Sciences, Faculty of Agriculture, University of Miyazaki, Miyazaki, Japan

⁴ Center for Animal Disease Control, University of Miyazaki, Miyazaki, Japan

⁵ Health Care Management Center, Chiba University Hospital, Chiba, Japan

⁶ Clinical Research Support Center, University of Miyazaki Hospital, Miyazaki, Japan

⁷ Division of Psychiatry, Department of Clinical Neuroscience, Faculty of Medicine, University of Miyazaki, Miyazaki, Japan

Word count: 3,399

ABSTRACT

Objectives: To clarify the dissemination status of cognitive behavioral therapy (CBT) in Japan under the national health insurance scheme.

Design: Retrospective observational study.

Setting: National Database of Health Insurance Claims and Specific Health Checkups of Japan.

Participants: Patients who received CBT under the national health insurance scheme from fiscal years (FY) 2010 to 2015.

Primary and secondary outcome measures: We estimated the change rate and the standardized claim ratio (SCR) for the number of patients receiving CBT and analyzed the association between the CBT status and several regional factors.

Results: We found that: (a) a total of 60,304 patients received CBT during the study period; (b) the number of patients receiving CBT was highest in the first year (-1.8% from FY2010 to FY2015); (c) the number of patients who received CBT per 100,000 population decreased (or remained at zero) in most prefectures (32 out of 47); (d) there was a maximum 424.7-fold difference between prefectures in standardized claim ratio for CBT; (e) the number of registered CBT institutions was significantly associated with the number of patients who received CBT.

Conclusions: The provision of CBT did not increase in the first six years (FY2010–2015) after its coverage in Japan's national health insurance scheme. Further studies including a questionnaire survey of registered CBT institutions are required to get more detailed information on the dissemination of CBT in Japan.

Strengths and limitations of this study:

- This is the first study to describe in the provision status of cognitive behavioral therapy (CBT) in Japan using a nationwide database which covers all electronic claims in Japan's national health insurance system.
- The main limitation of this study is that our data does not include medical treatment data for any treatment provided outside the national system (e.g. private counseling).
- Our ecological analysis was conducted using specific variables, so there could be other factors which affect the provision of CBT.

32 INTRODUCTION

33 Disseminating effective treatment for psychiatric disorders is urgently required around
34 the world. Mathers and Loncar[1] reported that major depression is predicted to be the
35 leading cause of burden of disease in high-income countries by 2030; HIV/AIDS and
36 perinatal disorders rank higher only in low-income and middle-income countries.
37 Although mood disorders including major depression have been reported to be less
38 prevalent in Asian countries than in Western countries, they have become more
39 common among Japanese since the 2000's, which might reflect the Japanese
40 government's attempt to raise people's awareness of mental health.[2, 3] The rate of
41 mental health service use in Japan has also increased in the past twenty years.[4]

42 Since the 1980s, effective psychological interventions for a wide range of
43 psychiatric disorders have been empirically developed. Among them, cognitive
44 behavioral therapy (CBT) has consistently been shown to be effective for various
45 psychiatric disorders on both a short- and long-term basis,[5-13] and has also been a
46 strongly recommended treatment option for both inpatients and outpatients in national
47 guidelines.[14-18] Importantly, patients often desire to receive psychotherapy rather
48 than pharmacotherapy.[19, 20] However, there is evidence that empirically supported

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

49 CBT is rarely available (or is delivered suboptimally) in routine clinical care in Western
50 countries.[21, 22]

51 In order to address the problem, in 2008 England's National Health Service
52 (NHS) instigated a therapists' post-qualification training program, the English
53 Improving Access to Psychological Therapies (IAPT) program. The IAPT training
54 program is delivered as a joint venture between universities and clinical services, and
55 has been implemented across England. Over a one-year training period, high-intensity
56 trainees (providing traditional face-to-face therapy) attend a university-based course for
57 lectures, workshops and case supervision two days a week, while low-intensity trainees
58 (providing guided self-help, brief therapy, etc.) attend university for one day per week.
59 For the rest of their time, both sets of trainees work in an IAPT service where they
60 receive further regular supervision. For the first ten years of the IAPT, the number of
61 patients who received psychotherapy (including CBT) increased markedly (from
62 181,947 patients in fiscal year [FY] 2009 to 1,092,296 patients in FY2018).[23, 24]

63 In Japan, CBT was introduced to the psychiatric field in the late 1980s.[25]
64 Since FY2010, CBT for outpatients with mood disorders has been covered by the
65 national health insurance scheme. This marked a milestone in Japanese mental health
66 service where pharmacotherapy has historically been much more common.[26-28]

Subsequently, since FY2011, the Japanese Ministry of Health Labor and Welfare (MHLW) has started to organize training for therapists to disseminate CBT. However, it is still unclear whether CBT is routinely implemented in Japanese clinical settings under the national health insurance scheme. Two studies have employed a questionnaire method to investigate the capability of providing CBT in Japanese psychiatric institutions, but the very low return/response rates (16.5% and 20.3%) limit the generalizability of the findings.[29, 30]

The current study aims to assess the dissemination status of CBT in the first six years (FY2010–2015) after its inclusion in the national insurance scheme in Japan, using the nationwide claims database. We selected ambulatory psychotherapy, the psychotherapy provided in the routine psychiatric outpatient care, as a reference. Data on the actual dissemination status of CBT (including regional variations) has never been widely available, and such data is needed to estimate the unmet need for services, to promote open discussion between policy makers and general public, and to guide mental health care policy initiatives in the future.

METHODS

Main data source and extracted data

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

85 The present retrospective observational study was conducted using data from the
86 National Database of Health Insurance Claims and Specific Health Checkups of Japan
87 (NDB), a Japanese nationwide health insurance claims database operated by the
88 MHLW. Japan utilizes a universal healthcare system, patients pay 10–30% of their total
89 medical fees according to patients' age and socioeconomic status. To earn all medical
90 fees, medical care facilities have to submit medical fee claims to their municipality (see
91 online supplementary figure 1). The NDB has all electronic claims, 99% of all claims
92 issued from hospitals and clinics,[31] and stores approximately 1.9 billion claims
93 annually. The claims data contains various clinical and procedural information, such as
94 patients' sex, age, month of examination, diagnostic code, medical practice code, drug
95 code, and hospital code. Personally identifiable data (e.g. name, beneficiary
96 identification number, date of birth) are automatically converted into hash values at the
97 time of storage in NDB to make it irreversibly anonymous.

98 We used accumulated NDB data from FY2010 to FY2015 regarding CBT
99 [code 180035910 and 180033210]. We also collected NDB data regarding ambulatory
100 psychotherapy as a reference (≥ 30 minutes [code 180012210] and < 30 minutes [code
101 180031010]). Ambulatory psychotherapy in the national health insurance scheme
102 includes any type of psychotherapy (e.g. supportive psychotherapy) implemented by

psychiatrists in routine outpatient care. We chose this as a reference to CBT because:

(1) both psychotherapies target only outpatients, and (2) both are provided only by a medical doctor (table 1). CBT and ambulatory psychotherapy cannot be ticked at the same time. Extracted NDB data provided the exact number of patients who received each psychotherapy in each age group and prefecture. Each patient was counted as "one" even though the patient received more than one session. We did not collect diagnostic codes because it is said that diagnostic codes in NDB do not reflect the actual patient's diagnosis due to insurance claims needs.[32] To address the uncertainty/inaccuracy of diagnostic codes in NDB, some studies have combined diagnostic codes with other reliable examination or treatment codes (e.g. breast cancer code + cancer treatment codes [surgery/chemotherapy/medication/radiation procedure]).[33] However, in the psychiatric field, diagnostic codes in NDB are usually based on medical doctors' own judgement, and there are no other reliable examination or treatment codes to determine specific disorders. Therefore, we only focused on reliable medical practice codes in this study.

Table 1. CBT and ambulatory psychotherapy in Japan's national health insurance scheme

CBT	Ambulatory psychotherapy
-----	--------------------------

	CBT(1) ^a	CBT(2)	≥ 30 min	< 30 min
Code	180035910	180033210	180012210	180031010
Time	> 30 min		≥ 30 min	5-30 min
Provider	trained designated psychiatrist ^{b, c}	trained medical doctor ^b	any psychiatrist	
Target	only mood disorder		any psychiatric disorder	
Institutional registration	+ ^d		-	
Medical fees per session	5,000 JPY (33 GBP)	4,200 JPY (28 GBP)	4,000 JPY (27 GBP)	3,300 JPY (22 GBP)
Maximum of medical fees per hour	10,000 JPY (67 GBP)	8,400 JPY (56 GBP)	8,000 JPY (54 GBP)	23,100 JPY ^e (155 GBP)

^a CBT(1) have been established since fiscal year 2012.

^b who received some kind of any training for CBT.

^c Designated psychiatrist (Mental Health and Welfare Law-authorized) who also cooperates with local psychiatric emergency medical services (e.g. holiday/night medical examinations).

^d Institutions need to register their institution's name along with CBT providers names (trained designated psychiatrists or trained medical doctors) to the Regional Bureau of Health and Welfare of Japan.

^e assuming that a psychiatrist sees 7 patients per hour.[34]

128 CBT, cognitive behavioral therapy; JPY, Japanese yen; GBP, Great Britain
 129 pound.

130 Exchange rate: 1 GBP = 150 JPY.

131

132 **Analysis**

133 Firstly, we calculated the change rate for the number of patients who received CBT or
 134 ambulatory psychotherapy from FY2010 through FY2015. A baseline for the rate of
 135 change for each psychotherapy was the number of patients in FY2010. Secondly, we
 136 calculated the number of patients who received each psychotherapy per 100,000
 137 population, and then assessed the increase or decrease in patients between FY2010 and
 138 FY2015 by prefecture. Thirdly, we calculated the standardized claim ratio (SCR) for the
 139 number of patients who received CBT. The indicator is based on the same logic as the
 140 standardized mortality ratio (e.g. it signifies that a prefecture with an SCR over 100 has
 141 more patients who received CBT than the national mean). The SCR is calculated
 142 according to the following formula;

$$\begin{aligned}
 \text{SCR} &= \frac{\Sigma \text{ Observed number (N) of claims}}{\Sigma \text{ Expected N of claims}} \times 100 \\
 &= \frac{\Sigma \text{ Observed N of claims by age group} \times 100}{\Sigma \text{ Population by age group} \times \text{Claim rate by age group}} \\
 &= \frac{\Sigma \text{ Observed N of claims by age group} \times 100}{\Sigma \text{ Population by age group} \times \frac{\text{Observed N of claims by age group in Japan}}{\text{Population by age group in Japan}}}
 \end{aligned}$$

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

144 Fourthly, in order to assess regional factors related to the provision of CBT, we
145 examined associations between CBT patients per 100,000 population and the following
146 variables: (1) registered institutions for CBT per 100,000 population from Regional
147 Bureau of Health and Welfare of Japan; (2) psychiatrists per 100,000 population from
148 the portal site for Japanese Government Statistics, by using linear mixed effects models.
149 Fixed effects were the above three variables and year; prefecture was included as a
150 random effect. We also investigated the association between SCR for CBT and the
151 implementation of formal CBT training (organized by the MHLW) using independent t-
152 test. The dependent variable was SCR for CBT, and the independent variables were
153 prefecture groups that had been classified according to whether or not formal CBT
154 training had been implemented (at least 1 time). Significant differences were indicated
155 at p value < 0.05. Data were analyzed using the SAS software ver. 9.4 (SAS Institute
156 Inc., Cary, NC, USA).

157

158 **Patient and public involvement**

159 Patients or public were not involved in this study.

160

161 **Results**

During the study period (FY2010–2015), 60,304 patients received CBT and 34,628,225 patients received ambulatory psychotherapy. There is no big difference in terms of demographic data between these psychotherapies: more females than males received each psychotherapy, with most patients (male and female) being aged between 20–59 (see online supplementary table 1). As for trends over time (figure 1), the number of patients who received CBT dropped in FY2012 and thereafter recovered slightly from FY2013, but not to the level of FY2010 (when CBT was first added to the health insurance scheme). CBT patients decreased by 1.8% from FY2010 to FY2015. In contrast, the number of patients who received both types of ambulatory psychotherapy continued to increase; of these, ambulatory psychotherapy (≥ 30 min) increased dramatically from FY2012.

[Insert figure 1 about here]

At the prefectural level, from FY2010 to FY2015, patients receiving CBT per 100,000 population decreased (or remained at zero) in 32 of 47 prefectures, whereas patients receiving ambulatory psychotherapy per 100,000 population increased in all prefectures. Figure 2 shows the SCR for the number of patients who received each psychotherapy in the study period. There was a maximum 424.7-fold difference in SCR between the highest (SCR = 585.2 in Ishikawa) and lowest (SCR = 1.4 in Tokushima)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

180 prefectures. Meanwhile, there was a maximum 3.4-fold difference in SCR of
181 ambulatory psychotherapy (see online supplementary table 2).

182 *[Insert figure 2 about here]*

183 In terms of the relationship between regional factors and the provision of CBT,
184 the number of patients who received CBT per 100,000 population was associated
185 significantly with the number of registered CBT institutions per 100,000 population (p
186 < 0.01) (table 2). If the number of registered institutions per 100,000 population
187 increased by one, the number of patients increased by 23.1 (standard error = 3.4)
188 patients per 100,000 population. The other factors were not associated with the number
189 of CBT patients per 100,000 population or SCR for CBT (table 2 and 3).

Table 2. Results of ecological analysis on factors associated with number of patients who received CBT per 100,000 population (FY2010–2015)						
		Estimate	Standard error	Degree of freedom	T value	p value
Number of registered CBT institutions per 100,000 population	Intercept	-5.0	2.6	46	-1.9	0.06
	Slope	23.1	3.4	137	6.7	< 0.01*
Number of psychiatrists	Intercept	4.4	5.9	46	0.7	0.46

per 100,000 population	Slope	0.3	0.4	91	0.6	0.52
---------------------------	-------	-----	-----	----	-----	------

* indicates significant difference.

CBT, cognitive behavioral therapy; FY, fiscal year.

Table 3. Association between implementation of formal CBT training and SCR for CBT (FY2010–2015)

	Training [-]	Training [+]	p value
Prefectures (n)	37	10	-
SCR for CBT (Mean \pm SE)	98.0 \pm 23.0	73.2 \pm 19.9	0.59

Degree of freedom = 45, t value = 0.54.

CBT, cognitive behavioral therapy; SCR, standardized claim ratio; FY, fiscal year; SE, standard error.

DISCUSSION

This is the first study to use the nationwide claim database to demonstrate in detail the provision status of CBT in Japan in the first six years (FY2010–2015) after its inclusion in the national health insurance scheme. Our results show that: (a) approximately 60,000 patients received CBT during the study period; (b) the number of patients receiving CBT was highest in the first year (-1.8% from FY2010 to FY2015), whereas

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

204 ambulatory psychotherapies continued to increase over six years (+121.3% [≥ 30 min]
205 and +17.7% [< 30 min] from FY2010 to FY2015); (c) the number of patients receiving
206 CBT per 100,000 decreased (or remained at zero) in most prefectures (32 out of 47); (d)
207 based on SCR, there was a maximum 420-fold regional difference in the number of
208 CBT patients between prefectures; (e) the number of registered CBT institutions was
209 significantly associated with the number of patients receiving CBT. Overall, the current
210 study indicates that the provision of CBT did not increase under Japan's health
211 insurance scheme from FY2010 to FY2015.

212 The reasons that the provision of CBT reached a plateau in Japan could be due
213 to strict requirements and low medical fees for therapists/institutions in the national
214 health insurance system. For example, a CBT provider must be a medical doctor, must
215 target only outpatients with mood disorder, and the provider's institution must be
216 registered to the Regional Bureau of Health and Welfare of Japan (table 1). Because
217 CBT is only allowed to treat mood disorders, one would reasonably expect ambulatory
218 psychotherapy to be provided at a higher rate than CBT. In terms of medical fees, CBT
219 fees in Japan are substantially lower than those in Western countries. For example, in
220 Japan, maximum fee for CBT is 5,000 Japanese yen (JPY) per session (equal to 33
221 Great Britain pounds [GBP], exchange rate: 1 GBP = 150 JPY), whereas the fee in

England is 97 GBP (equal to 14,550 JPY) per session.[35] Moreover, CBT fees are almost the same as ambulatory psychotherapy fees for sessions over 30 minutes despite the aforementioned restrictions (table 1). Thus, ambulatory psychotherapy sessions under 30 minutes yield the highest profits for medical doctors in Japan's national health insurance system. Indeed, Japanese psychiatrists see 7 outpatients per hour in routine clinical practice.[34] Furthermore, some studies have reported that the main obstacles in providing psychotherapy/CBT in Japan are a lack of time and profitability.[29, 30] Thus, more reasonable medical fees and requirements suitable to the actual conditions of routine clinical practice could motivate the use of CBT under the national health insurance scheme in Japan. Although we focused mainly on outpatient settings here, CBT for inpatients should also be included in the national health insurance scheme because it is recommended for inpatients with some disorders as well as in many international guidelines.

This study focused on CBT but a large shift in ambulatory psychotherapy (≥ 30 min) in FY2012 should be addressed. It seems that this large shift was caused by the revision of medical fee requirements for ambulatory psychotherapy in that year. Before the revision in FY2012, psychiatrists at any psychiatric institution were able to claim one type of ambulatory psychotherapy when they spent more than 60 minutes with a

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

240 patient for the first visit. However, the revision imposed cooperation with local
241 psychiatric emergency medical services (e.g. holiday/night medical examinations) on
242 psychiatrists for this type of ambulatory psychotherapy. Because of this, many
243 psychiatrists (especially those working at small psychiatric institutions) were no longer
244 able to claim the optional fees for ambulatory psychotherapy applied on the first visit.
245 As a result, it is possible that psychiatrists started claiming outpatients in the first visit
246 as covered by "ambulatory psychotherapy (≥ 30 min)".

247 Our results also showed a maximum approximately 420-fold difference in SCR
248 for CBT between prefectures, and a maximum 3.4-fold difference in SCR for
249 ambulatory psychotherapy. Namely, there was a large regional variation in CBT
250 utilization. In particular, SCR was low over the whole Tohoku region where effective
251 treatment for psychiatric disorders is in high demand because of the high suicide
252 rate.[36] In contrast, SCR in some prefectures (e.g. Ishikawa, Shimane, Gifu, Okayama,
253 Kumamoto) was noticeably high. Investigation into CBT efforts in these areas would be
254 helpful to fill in the gaps in regional variations in providing CBT. On the other hand,
255 one of the reasons for the large variation in SCR between prefectures may be that the
256 total number of CBT patients in Japan is small. Therefore, if a single institution in a

Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.
Erasmushogeschool

particular prefecture has many CBT patients, the SCR in that area would be overestimated because it is an indicator calculated from the national mean.

During the study period, formal CBT training had been implemented in 10 out of 47 prefectures. We predicted that the implementation of formal CBT training would be associated with SCR for CBT, but there was no association between these variables. The training consists of a two-day onsite workshop and continuous online clinical supervision. Thus, one of the reasons that medical doctors in regions with no workshop training can continue to provide CBT may be because they can receive continuous online supervised instruction irrespective of area. There was also a significant association between the number of CBT patients per 100,000 population and the number of registered CBT institutions per 100,000 population. These results suggest that an increase in institutions that have formally-trained medical doctors and that meet institutional criteria for CBT could lead to a wide-scale dissemination of CBT under the national health insurance scheme.

In order to make CBT much more widely available, recent success in England also offer lessons that are likely applicable to Japan. In England, the number of patients with depression finishing CBT increased by 181.2% from FY2013 to FY2018 (28,814 patients to 81,038 patients).[37] One of the reasons for this success could be an increase

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

275 in the number of therapists through a government-funded one-year systematic training,
276 IAPT (over new 7,000 therapists have trained in FY2015[38]). Because both England
277 and Japan have a universal healthcare system, such financial and logistical supports
278 from health care policymakers are crucial for a wide-scale implementation of CBT in
279 Japan.

280 The strength of this study is that the data source was the NDB, a
281 comprehensive database which covers all electronic claims in Japan’s national health
282 insurance system. However, there are also several limitations. First, the NDB does not
283 store medical treatment data for any treatment provided outside the national system (e.g.
284 private counseling). Although CBT for depression in Japan is mainly provided by
285 psychologists in routine care,[39] it is not covered by the national health insurance
286 system. Thus, there is a possibility that more CBT was actually conducted across Japan,
287 even in prefectures with few CBT patients under the health insurance scheme. Second,
288 we selected ambulatory psychotherapy as a reference to CBT because both
289 psychotherapies target only outpatients and both are provided only by a medical doctor.
290 However, this is still not an ideal reference because the provider and target of both
291 psychotherapies are not perfect analogs. Third, our ecological analysis was conducted
292 using specific variables. There could be other factors which affect the provision of CBT.

Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.
Erasmushogeschool

293 Finally, the observation period in this study is slightly outdated due to a delayed
294 acquisition process for NDB data from the MHLW. However, we believe that the
295 current study still has academic value for the following reasons. First, this is the first
296 study to demonstrate the status of CBT in Japan using comprehensive public data.
297 Second, our findings would be useful to future researchers/policymakers reviewing the
298 status of CBT in Japan after the observation period of this study. Because of these
299 limitations, further updates on the NDB (FY2016–) and the questionnaire survey of
300 registered CBT institutions are required.

301 Overall, our current study revealed some issues regarding the provision of CBT
302 in Japan in the first six years (FY2010–2015) after its coverage in the national health
303 insurance scheme. The number of patients receiving CBT in Japan did not increase
304 probably due to unprofitability for therapists/institutions in Japan's current healthcare
305 insurance system. Further, there were large regional variations in CBT status between
306 the 47 prefectures and a significant association between the number of CBT patients per
307 100,000 population and the number of registered CBT institutions per 100,000
308 population. These findings suggest that an appropriate evaluation of medical fees for
309 CBT in clinical settings and supporting hospitals and/or clinics in meeting the
310 institutional criteria for CBT would help in the widespread utilization of CBT in Japan.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Further research into the status of CBT in Japan after the observation period of this study (FY2016–) and a questionnaire survey of registered CBT institutions are required to get more detailed information on the dissemination of CBT.

Acknowledgements: The authors are grateful to Mr. Richard White for checking the English, and to Ms. Chieko Fujiyama for supporting data collection and entry.

Author Contributions: Conception and design of the study: YH, NY, HT, KY, YK, YA, TY, and YI; Acquisition of data: YH and NY; Analysis and interpretation of data: YH, NY, YS, HT, KY, YK, YA, TY, and YI; Drafting the manuscript: YH, NY, and YS. All authors critically reviewed the manuscript and approved of the final version.

Funding: This work was supported by a FY2017 (21th) research grant for young researchers from the Japanese Institute for Health Economics and Policy (<https://www.ihep.jp>) (to NY).

327 **Competing interests:** NY has received a speaking honorarium from Gakken Medical
328 Support, and writing honoraria from Igaku Shoin, Nihon-Hyounsha, Sogensha, and
329 Medical Friend. The other authors declare that they have no conflicts of interest.

331 **Patients consent for publication:** Not required.

333 **Ethics approval:** The study protocol was reviewed and approved by the Ethics
334 Committee of the University of Miyazaki (reference number: O-0017). We also got
335 permission to use a dataset extracted from the NDB (reference number: 1025-1).
336 Written informed consent was waived because all patient records were automatically
337 anonymized prior to storage in NDB (i.e. no one can identify specific patients).

339 **Provenance and peer review:** Not commissioned; externally peer reviewed.

341 **Data sharing statement:** The data used in this study are from the Ministry of Health,
342 Labour and Welfare (MHLW) in Japan and therefore, users of these data are strictly
343 limited to those who obtain official permission from the MHLW, in accordance with
344 Japanese Article 33 (Provision of Questionnaire Information) of the Statistics Act, by

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

345 the Statistic Bureau, Ministry of Internal Affairs and Communications. Qualified
346 researchers who would like to request access to the data should contact the Statistics
347 and Information Department of the MHLW. Please refer to the following URL:
348 <http://www.mhlw.go.jp/toukei/sonota/chousahyo.html>.

For peer review only

Erasmus Hogeschool
Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.

REFERENCES

1. Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Med* 2006;3:e442 doi:10.1371/journal.pmed.0030442 [published Online First: 30 November 2006].
2. Steel Z, Marnane C, Iranpour C, et al. The global prevalence of common mental disorders: a systematic review and meta-analysis 1980-2013. *Int J Epidemiol* 2014;43:476-93 doi: 10.1093/ije/dyu038 [published Online First: 22 Mar 2014].
3. Ishikawa H, Tachimori H, Takeshima T, et al. Prevalence, treatment, and the correlates of common mental disorders in the mid 2010's in Japan: The results of the world mental health Japan 2nd survey. *J Affect Disord* 2018;241:554-62 doi: 10.1016/j.jad.2018.08.050 [published Online First: 29 Aug 2018].
4. Kawakami N, Tachimori H, Takeshima T, et al. Report of the World Mental Health Japan Survey 2nd (2013–2015). 2016 wmhj2.jp/WMHJ2-2016R.pdf [in Japanese] (accessed 20 Dec 2017).
5. Butler AC, Chapman JE, Forman EM, et al. The empirical status of cognitive-behavioral therapy: a review of meta-analyses. *Clin Psychol Rev* 2006;26:17-31 doi:10.1016/j.cpr.2005.07.003 [published Online First: 4 October 2005].

- 1
2
3
4
5 367 6. Sado M, Knapp M, Yamauchi K, et al. Cost-effectiveness of combination therapy
6
7
8 368 versus antidepressant therapy for management of depression in Japan. *Aust N Z J*
9
10
11 369 *Psychiatry* 2009;43:539-47 doi:10.1080/00048670902873664 [published Online
12
13
14 370 First: 15 May 2009].
- 17 371 7. Fujisawa D, Nakagawa A, Tajima M, et al. Cognitive behavioral therapy for
18
19
20 372 depression among adults in Japanese clinical settings: a single-group study. *BMC*
21
22
23 373 *Res Notes* 2010;3:160 doi:10.1186/1756-0500-3-160.
- 26 374 8. Cuijpers P, Berking M, Andersson G, et al. A meta-analysis of cognitive-
27
28
29 375 behavioural therapy for adult depression, alone and in comparison with other
30
31
32 376 treatments. *Can J Psychiatry* 2013;58:376-85 doi:10.1177/070674371305800702
33
34
35 377 [published Online First: 23 July 2013].
- 38 378 9. Wiles N, Thomas L, Abel A, et al. Cognitive behavioural therapy as an adjunct to
39
40
41 379 pharmacotherapy for primary care based patients with treatment resistant
42
43
44 380 depression: results of the CoBaT randomised controlled trial. *Lancet*
45
46
47 381 2013;381:375-84 doi:10.1016/s0140-6736(12)61552-9 [published Online First: 12
48
49
50 382 December 2012].
- 53 383 10. Nakagawa A, Mitsuda D, Sado M, et al. Effectiveness of Supplementary Cognitive-
54
55
56 384 Behavioral Therapy for Pharmacotherapy-Resistant Depression: A Randomized
57
58
59
60

- Controlled Trial. *J Clin Psychiatry* 2017;78:1126-35 doi:10.4088/JCP.15m10511
[published Online First: 3 March 2017].
11. Takagaki K, Okamoto Y, Jinnin R, et al. Enduring effects of a 5-week behavioral
activation program for subthreshold depression among late adolescents: an
exploratory randomized controlled trial. *Neuropsychiatr Dis Treat* 2018;14:2633-
41 doi:10.2147/NDT.S172385 [published Online First: 24 October 2018].
12. Mavranzouli I, Mayo-Wilson E, Dias S, et al. The Cost Effectiveness of
Psychological and Pharmacological Interventions for Social Anxiety Disorder: A
Model-Based Economic Analysis. *PLoS One* 2015;10:e0140704
doi:10.1371/journal.pone.0140704 [published Online First: 28 October 2015].
13. Sava FA, Yates BT, Lupu V, et al. Cost-effectiveness and cost-utility of cognitive
therapy, rational emotive behavioral therapy, and fluoxetine (Prozac) in treating
depression: a randomized clinical trial. *J Clin Psychol* 2009;65:36-52
doi:10.1002/jclp.20550 [published Online First: 4 December 2008].
14. National Institute for Clinical Excellence (NICE). Clinical guidelines [CG90].
Depression in adults: recognition and management. 2009
www.nice.org.uk/guidance/cg90 (accessed 20 Dec 2017).

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

402 15. American Psychiatric Association (APA). Practice guideline for the treatment of
403 patients with acute stress disorder and posttraumatic stress disorder second edition.
404 2010
405 www.psychiatryonline.org/pb/assets/raw/sitewide/practice_guidelines/guidelines/pa
406 [nicdisorder.pdf](http://www.psychiatryonline.org/pb/assets/raw/sitewide/practice_guidelines/guidelines/pa) (accessed 20 Dec 2017).

407 16. Hay P, Chinn D, Forbes D, et al. Royal Australian and New Zealand College of
408 Psychiatrists clinical practice guidelines for the treatment of eating disorders. *Aust*
409 *N Z J Psychiatry* 2014;48:977-1008 doi:10.1177/0004867414555814 [published
410 Online First: 30 October 2014].

411 17. Parikh SV, Quilty LC, Ravitz P, et al. Canadian Network for Mood and Anxiety
412 Treatments (CANMAT) 2016 Clinical Guidelines for the Management of Adults
413 with Major Depressive Disorder: Section 2. Psychological Treatments. *Can J*
414 *Psychiatry* 2016;61:524-39 doi:10.1177/0706743716659418 [published Online
415 First: 4 August 2016].

416 18. Japanese Society of Mood Disorders. Guideline for treatment of major depressive
417 disorder. 2016 www.secretariat.ne.jp/jsmd/mood_disorder/img/160731.pdf [in
418 Japanese] (accessed 20 Dec 2017).

Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.
Erasmushogeschool

- 1
2
3
4
5 419 19. McHugh RK, Whitton SW, Peckham AD, et al. Patient preference for
6
7
8 420 psychological vs pharmacologic treatment of psychiatric disorders: a meta-analytic
9
10
11 421 review. *J Clin Psychiatry* 2013;74:595-602 doi:10.4088/JCP.12r07757 [published
12
13
14 422 Online First: 12 July 2013].
15
16
17 423 20. Dwight-Johnson M, Sherbourne CD, Liao D, et al. Treatment preferences among
18
19
20 424 depressed primary care patients. *J Gen Intern Med* 2000;15:527-34
21
22
23 425 doi:10.1046/j.1525-1497.2000.08035.x [published Online First: 12 August 2000].
24
25
26 426 21. Shafran R, Clark DM, Fairburn CG, et al. Mind the gap: Improving the
27
28
29 427 dissemination of CBT. *Behav Res Ther* 2009;47:902-9
30
31
32 428 doi:10.1016/j.brat.2009.07.003 [published Online First: 12 August 2009].
33
34
35 429 22. Gunter RW, Whittal ML. Dissemination of cognitive-behavioral treatments for
36
37
38 430 anxiety disorders: Overcoming barriers and improving patient access. *Clin Psychol*
39
40
41 431 *Rev* 2010;30:194-202 doi:10.1016/j.cpr.2009.11.001 [published Online First: 28
42
43
44 432 November 2009].
45
46
47 433 23. Department of Health. IAPT three-year report: The first million patients. 2012
48
49
50 434 webarchive.nationalarchives.gov.uk/20160302155226/http://www.iapt.nhs.uk/silo/f
51
52
53 435 iles/iapt-3-year-report.pdf (accessed 30 Dec 2019).
54
55
56
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

24. NHS Digital. Psychological Therapies; Annual report on the use of IAPT services: England 2018-19. 2019 files.digital.nhs.uk/1C/538E29/psych-ther-2018-19-ann-rep.pdf (accessed 30 Dec 2019).

25. Ono Y, Furukawa TA, Shimizu E, et al. Current status of research on cognitive therapy/cognitive behavior therapy in Japan. *Psychiatry Clin. Neurosci* 2011;65:121-9 doi:10.1111/j.1440-1819.2010.02182.x [published Online First: 19 March 2011].

26. International Narcotics Control Board. Report of the International Narcotics Control Board on the Availability of Internationally Controlled Drugs: Ensuring Adequate Access for Medical and Scientific Purposes. 2010
www.incb.org/documents/Publications/AnnualReports/AR2010/Supplement-AR10_availability_English.pdf (accessed 20 Dec 2017).

27. Yoshio T. The trend for megadose polypharmacy in antipsychotic pharmacotherapy: a prescription survey conducted by the psychiatric clinical pharmacy research group. *Seishin Shinkeigaku Zasshi* 2012;114:690-95 [in Japanese].

28. Okumura Y, Shimizu S, Matsumoto T. Prevalence, prescribed quantities, and trajectory of multiple prescriber episodes for benzodiazepines: A 2-year cohort

Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.
Erasmushogeschool

- study. *Drug Alcohol Depend* 2016;158:118-25
doi:10.1016/j.drugalcdep.2015.11.010.
29. Fujisawa D, Nakagawa A, Sado M, et al. Current status and dissemination of
psychotherapies in Japan. Japan Ministry of Health and Labor 2006 [in Japanese].
30. Takahashi F, Takegawa S, Okumura Y, et al. Actual condition survey on the
implementation of Cognitive Behavioral Therapy at psychiatric clinics in Japan.
2018 [www.ftakalab.jp/wordpress/wp-](http://www.ftakalab.jp/wordpress/wp-content/uploads/2011/08/japancbtclinic_report.pdf)
[content/uploads/2011/08/japancbtclinic_report.pdf](http://www.ftakalab.jp/wordpress/wp-content/uploads/2011/08/japancbtclinic_report.pdf) [in Japanese] (accessed 9 Jan
2018).
31. Japanese Ministry of Health, Labour and Welfare. Status of dissemination of
electronically submitted claims. 2015 [www.mhlw.go.jp/file/06-Seisakujouhou-](http://www.mhlw.go.jp/file/06-Seisakujouhou-12400000-Hokenkyoku/0000099002.pdf)
[12400000-Hokenkyoku/0000099002.pdf](http://www.mhlw.go.jp/file/06-Seisakujouhou-12400000-Hokenkyoku/0000099002.pdf) [in Japanese] (accessed 20 Dec 2017).
32. Nakayama T, Imanaka Y, Okuno Y, et al. Analysis of the evidence-practice gap to
facilitate proper medical care for the elderly: investigation, using databases, of
utilization measures for National Database of Health Insurance Claims and Specific
Health Checkups of Japan (NDB). *Environ Health Prev Med* 2017;22
doi:10.1186/s12199-017-0644-5

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

471 33. Sato I, Yagata H, Ohashi Y. The Accuracy of Japanese Claims Data in Identifying
472 Breast Cancer Cases. *Biol. Pharm. Bull* 2015;38:53-7.

473 34. Nakagawa A, Williams A, Sado M, et al. Comparison of treatment selections by
474 Japanese and US psychiatrists for major depressive disorder: A case vignette study.
475 *Psychiatry Clin. Neurosci* 2015;69:553-62. doi:10.1111/pcn.12273 [published
476 Online First: 21 Jan 2015].

477 35. Curtis L, Burns A. Unit Costs of Health and Social Care 2016, Personal Social
478 Services Research Unit. Canterbury: University of Kent 2016
479 www.pssru.ac.uk/project-pages/unit-costs/unit-costs-2016/ (accessed 20 Dec 2017).

480 36. Japanese Ministry of Health, Labour and Welfare. Number of suicide based on
481 statistics report by National Police Agency. 2019
482 www.mhlw.go.jp/content/201812-sokuhou.pdf [in Japanese] (accessed 25 Jan
483 2019).

484 37. NHS Digital. Psychological Therapies, Annual Reports on the use of IAPT
485 services. 2019 [digital.nhs.uk/data-and-](http://digital.nhs.uk/data-and-information/publications/statistical/psychological-therapies-annual-reports-on-the-use-of-iapt-services)
486 [information/publications/statistical/psychological-therapies-annual-reports-on-the-](http://digital.nhs.uk/data-and-information/publications/statistical/psychological-therapies-annual-reports-on-the-use-of-iapt-services)
487 [use-of-iapt-services](http://digital.nhs.uk/data-and-information/publications/statistical/psychological-therapies-annual-reports-on-the-use-of-iapt-services) (accessed 30 Dec 2019).

Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.
Erasmus Hogeschool

- 1
2
3
4
5 488 38. Clark DM. Realizing the Mass Public Benefit of Evidence-Based Psychological
6
7
8 489 Therapies: The IAPT Program. *Annu Rev Clin Psychol* 2018;14:159-83
9
10
11 490 doi:10.1146/annurev-clinpsy-050817-084833.
12
13
14 491 39. Sato H, Tanno Y. The Effect of Cognitive Behavioral Therapy for Depression
15
16
17 492 Delivered by Japanese Psychologists : A Systematic Review. *Japanese journal of*
18
19
20 493 *behavior therapy* 2012;38:157-67 [in Japanese].
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

494 **Figure legends:**

495 **Figure 1.** Trends over time for the number of outpatients who received
496 psychotherapy in Japan.

497 FY, fiscal year.

498 **Figure 2.** Geographical distribution of standardized claim ratio (SCR) for the
499 number of outpatients who received psychotherapy in Japan from fiscal years
500 2010 to 2015.

501 The color bar shows a degree of SCR. SCR of 100 indicates the national mean.

Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.
Erasmus Hogeschool

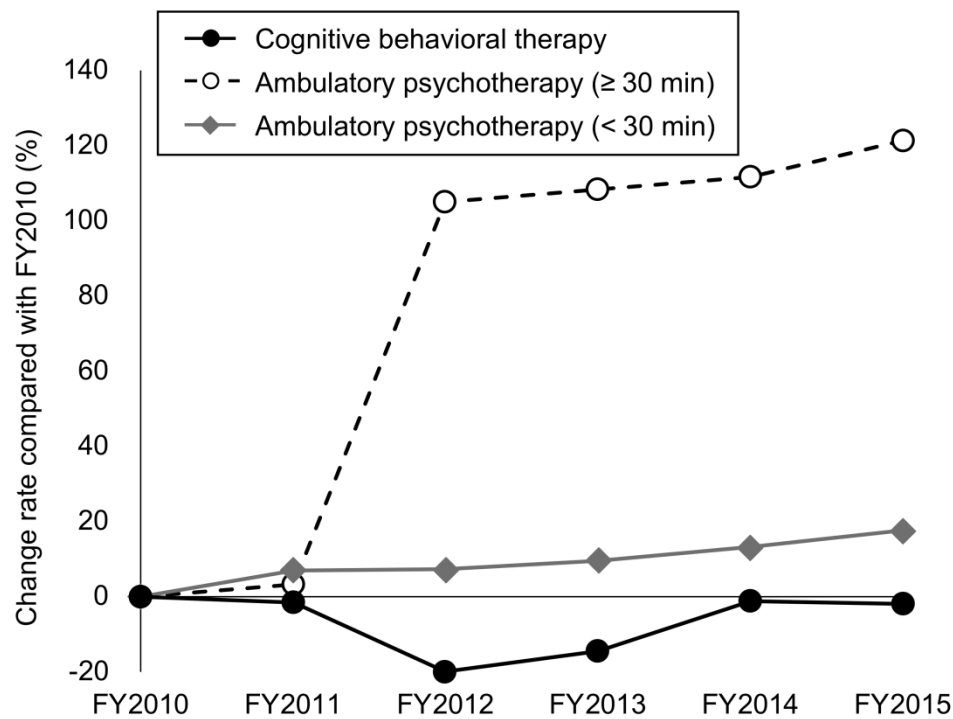


Figure 1. Trends over time for the number of outpatients who received psychotherapy in Japan. FY, fiscal year.

254x190mm (300 x 300 DPI)

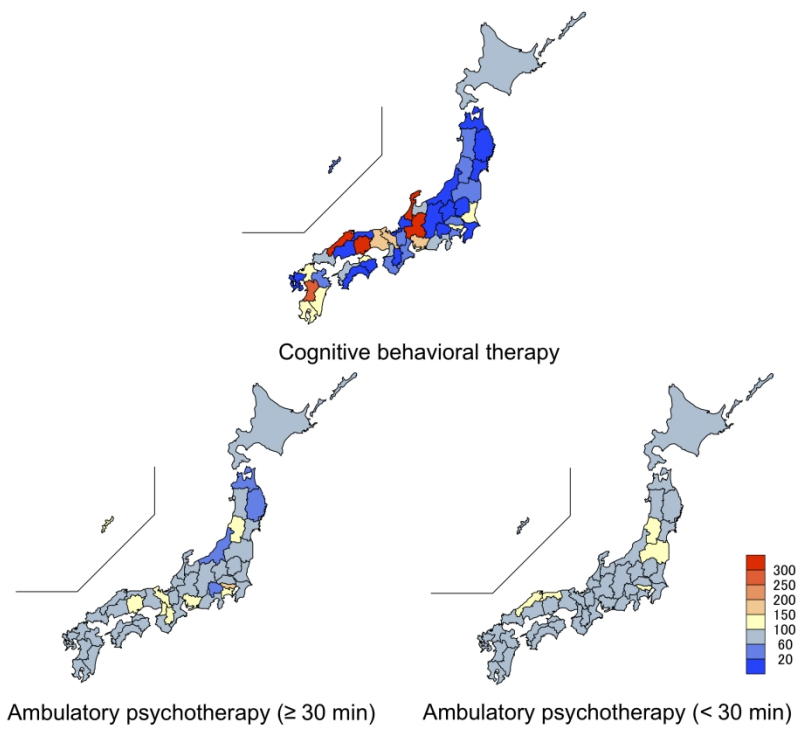
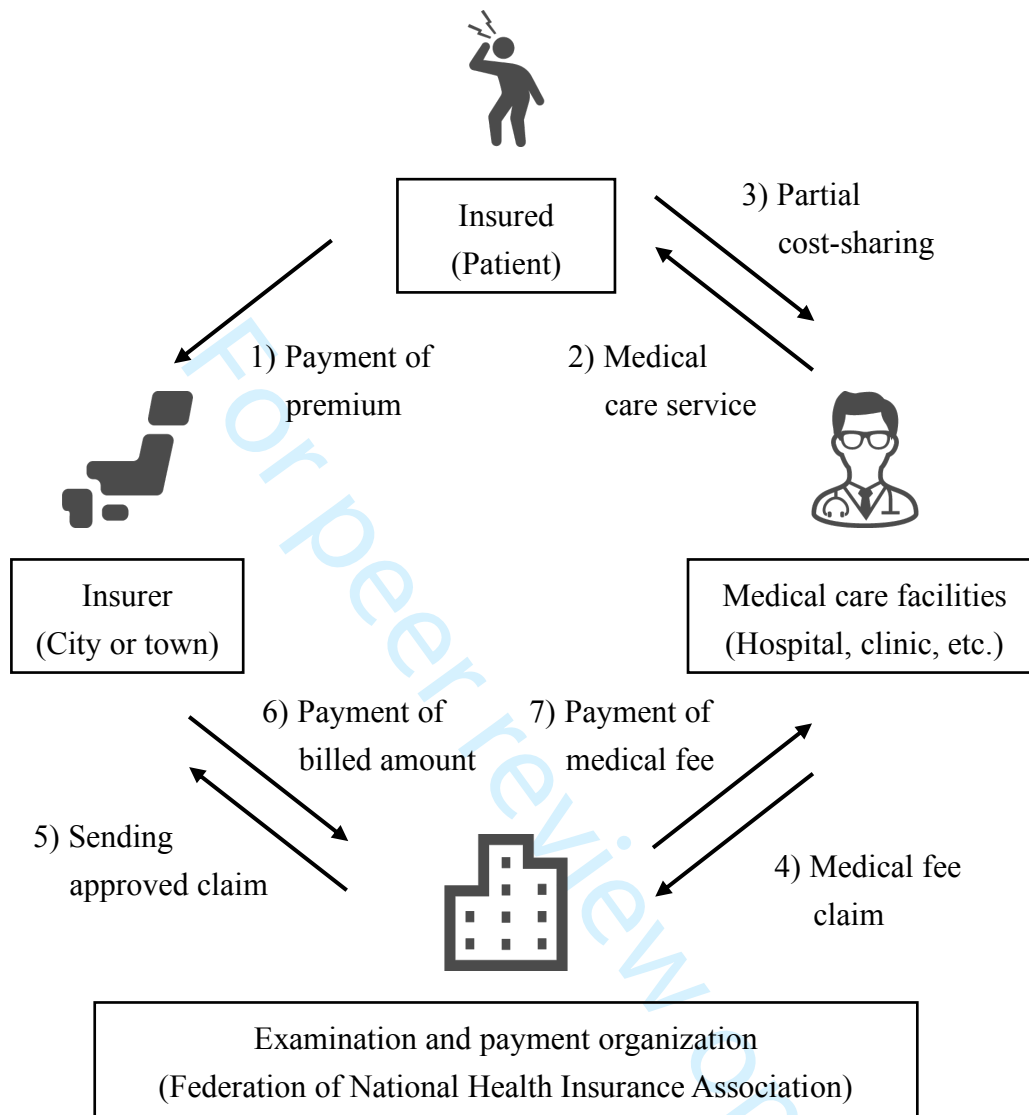


Figure 2. Geographical distribution of standardized claim ratio (SCR) for the number of outpatients who received psychotherapy in Japan from fiscal years 2010 to 2015. The color bar shows a degree of SCR. SCR of 100 indicates the national mean.

254x190mm (300 x 300 DPI)

Supplementary Figure 1. Overview of Japan's universal healthcare system



Supplementary Table 1. Demographic data of outpatients who received each psychotherapies by sex and age groups

	FY2010						FY2011					
	Ambulatory						Ambulatory					
	CBT	%	psychotherapy				CBT	%	Psychotherapy			
			≥ 30 min	%	< 30 min	%			≥ 30 min	%	< 30 min	%
Male (years)	3,911	34.9	266,900	40.4	1,979,923	42.6	3,896	35.5	279,000	40.8	2,135,354	42.9
0-9	13	0.1	24,510	3.7	34,028	0.7	87	0.8	26,480	3.9	37,825	0.8
10-19	135	1.2	33,955	5.1	85,966	1.9	230	2.1	35,715	5.2	95,109	1.9
20-29	660	5.9	39,449	6.0	231,457	5.0	648	5.9	41,733	6.1	242,586	4.9
30-39	1,027	9.2	52,128	7.9	429,146	9.2	931	8.5	52,961	7.8	447,328	9.0
40-49	900	8.0	43,379	6.6	418,062	9.0	821	7.5	45,867	6.7	457,105	9.2
50-59	451	4.0	25,776	3.9	298,054	6.4	426	3.9	26,776	3.9	321,345	6.5
60-69	304	2.7	18,412	2.8	225,926	4.9	270	2.5	18,563	2.7	252,745	5.1
70-79	233	2.1	17,154	2.6	165,747	3.6	254	2.3	17,855	2.6	180,096	3.6
≥ 80	188	1.7	12,137	1.8	91,537	2.0	229	2.1	13,050	1.9	101,215	2.0
Female (years)	7,285	65.1	393,585	59.6	2,662,976	57.4	7,084	64.5	404,249	59.2	2,839,696	57.1
0-9	-	-	8,532	1.3	11,131	0.2	27	0.2	9,415	0.4	12,570	0.3
10-19	240	2.1	35,604	5.4	90,061	1.9	314	2.9	35,701	5.2	92,282	1.9
20-29	1,435	12.8	73,045	11.1	349,509	7.5	1,475	13.4	73,823	10.8	356,484	7.2
30-39	1,821	16.3	82,301	12.5	496,888	10.7	1,684	15.3	82,397	12.1	515,329	10.4
40-49	1,317	11.8	59,671	9.0	432,489	9.3	1,187	10.8	63,124	9.2	471,593	9.5
50-59	745	6.7	37,629	5.7	341,547	7.4	640	5.8	38,391	5.6	360,082	7.2
60-69	596	5.3	33,855	5.1	362,120	7.8	570	5.2	34,571	5.1	400,893	8.1
70-79	607	5.4	34,972	5.3	337,177	7.3	573	5.2	36,171	5.3	363,038	7.3
≥80	524	4.7	27,976	4.2	242,054	5.2	614	5.6	30,656	4.5	267,425	5.4
Total	11,196	100.0	660,485	100.0	4,642,899	100.0	10,980	100.0	683,249	100.0	4,975,050	100.0

	FY2012						FY2013					
	Ambulatory						Ambulatory					
	CBT	%	psychotherapy				CBT	%	psychotherapy			
			≥ 30 min	%	< 30 min	%			≥ 30 min	%	< 30 min	%
Male (years)	3,076	34.6	560,242	42.1	2,165,896	43.2	3,335	35.1	569,291	42.0	2,219,842	43.2
0-9	38	0.4	35,832	2.7	42,067	0.8	87	0.9	39,511	2.9	44,852	0.9
10-19	205	2.3	56,679	4.3	101,667	2.0	289	3.0	62,003	2.6	110,685	2.2
20-29	596	6.7	96,743	7.3	241,561	4.8	634	6.7	97,146	7.2	242,685	4.7
30-39	820	9.2	117,335	8.8	434,811	8.7	791	8.3	114,192	8.4	429,615	8.4
40-49	669	7.5	101,404	7.6	472,920	9.4	707	7.4	103,653	7.6	493,436	9.6
50-59	361	4.1	56,336	4.2	324,168	6.5	358	3.8	58,176	4.3	339,876	6.6
60-69	132	1.5	35,539	2.7	249,642	5.0	165	1.7	34,569	2.5	252,337	4.9
70-79	123	1.4	33,967	2.6	184,434	3.7	159	1.7	33,671	2.5	186,195	3.6
≥ 80	132	1.5	26,407	2.0	114,626	2.3	145	1.5	26,370	1.9	120,161	2.3
Female (years)	5,807	65.4	771,408	57.9	2,850,916	56.8	6,168	64.9	786,834	58.0	2,912,985	56.8
0-9	13	0.1	12,801	1.0	13,991	0.3	32	0.3	14,292	1.1	14,791	0.3
10-19	327	3.7	58,361	4.4	90,174	1.8	334	3.5	61,544	4.5	92,688	1.8
20-29	1,341	15.1	152,412	11.4	342,357	6.8	1,331	14.0	153,488	11.3	340,023	6.6
30-39	1,494	16.8	155,592	11.7	497,402	9.9	1,445	15.2	155,481	11.5	496,462	9.7
40-49	1,096	12.3	122,844	9.2	487,840	9.7	1,198	12.6	129,208	9.5	516,329	10.1
50-59	584	6.6	73,272	5.5	358,659	7.1	673	7.1	76,207	5.6	372,409	7.3
60-69	360	4.1	64,996	4.9	391,051	7.8	397	4.2	65,076	4.8	392,264	7.6
70-79	294	3.3	69,522	5.2	367,981	7.3	374	3.9	69,623	5.1	372,923	7.3
≥80	298	3.4	61,608	4.6	301,461	6.0	384	4.0	61,915	4.6	315,096	6.1
Total	8,883	100.0	1,331,650	100.0	5,016,812	100.0	9,503	100.0	1,356,125	100.0	5,132,827	100.0

	FY2014						FY2015					
	CBT	%	Ambulatory psychotherapy				CBT	%	Ambulatory psychotherapy			
			≥ 30 min	%	< 30 min	%			≥ 30 min	%	< 30 min	%
Male (years)	3,875	35.3	586,888	42.6	2,300,881	43.5	3,865	35.3	622,021	43.1	2,403,172	43.7
0-9	33	0.3	43,989	3.2	50,390	1.0	40	0.4	47,545	3.3	57,976	1.1
10-19	349	3.2	64,301	4.7	119,572	2.3	413	3.8	71,046	3.9	134,036	2.4
20-29	689	6.3	99,072	7.2	248,292	4.7	781	7.1	106,333	7.4	260,323	4.7
30-39	963	8.8	113,575	8.2	427,762	8.1	894	8.2	115,858	8.0	427,604	7.8
40-49	791	7.2	107,432	7.8	517,169	9.8	757	6.9	112,828	8.8	539,896	9.8
50-59	458	4.2	61,797	4.5	361,529	6.8	427	3.9	67,209	4.7	386,159	7.0
60-69	206	1.9	35,107	2.5	258,163	4.9	224	2.0	36,744	2.5	267,293	4.9
70-79	202	1.8	33,992	2.5	191,525	3.6	194	1.8	35,160	2.4	195,045	3.6
≥ 80	184	1.7	27,623	2.0	126,479	2.4	135	1.2	29,298	2.0	134,840	2.5
Female (years)	7,095	64.7	791,424	57.4	2,992,615	56.5	7,077	64.7	819,723	56.9	3,090,963	56.3
0-9	21	0.2	15,395	1.1	16,580	0.3	25	0.2	16,761	1.2	18,807	0.3
10-19	427	3.9	61,191	4.4	95,814	1.8	499	4.6	67,150	4.7	103,448	1.9
20-29	1,390	12.7	150,502	10.9	338,609	6.4	1,398	12.8	154,718	10.7	344,264	6.3
30-39	1,568	14.3	152,600	11.1	494,340	9.3	1,533	14.0	152,159	10.6	494,355	9.0
40-49	1,528	13.9	133,540	9.7	545,860	10.3	1,636	15.0	139,034	9.6	573,414	10.4
50-59	779	7.1	79,907	5.8	393,351	7.4	830	7.6	85,473	7.5	416,398	7.6
60-69	432	3.9	63,576	4.6	394,986	7.5	373	3.4	65,256	4.5	400,465	7.3
70-79	467	4.3	70,617	5.1	383,780	7.3	399	3.6	71,180	4.9	389,717	7.1
≥80	483	4.4	64,096	4.7	329,295	6.2	384	3.5	67,992	4.7	350,095	6.4
Total	10,970	100.0	1,378,312	100.0	5,293,496	100.0	10,942	100.0	1,441,744	100.0	5,494,135	100.0

*Number of patients less than 10 people were noted as zero (-) in order to prevent unwanted identification of personal information.

Abbreviation: CBT, cognitive behavioral therapy; FY, fiscal year.

Supplementary Table 2. Standardized claim ratio of outpatients who received each psychotherapies by prefecture

Prefecture	CBT	Ambulatory psychotherapy	
		≥ 30 min	< 30 min
Japan	reference*	reference*	reference*
Hokkaido	63.8	74.5	94.7
Aomori	8.7	51.7	82.1
Iwate	8.6	57.8	88.5
Miyagi	19.7	97.5	88.3
Akita	29.0	99.4	90.3
Yamagata	51.8	118.3	106.3
Fukushima	29.7	89.0	102.6
Ibaraki	138.9	60.7	71.4
Tochigi	13.9	60.7	85.0
Gunma	18.9	98.0	91.7
Saitama	42.9	68.8	77.1
Chiba	15.5	73.0	87.6
Tokyo	144.2	176.2	118.7
Kanagawa	47.8	108.2	92.2
Niigata	11.3	57.3	96.0
Toyama	60.5	66.4	85.8
Ishikawa	585.2	71.1	89.2
Fukui	1.9	81.3	97.6
Yamanashi	14.6	57.4	71.8
Nagano	5.7	95.2	97.2
Gifu	388.0	86.9	78.9
Shizuoka	75.1	70.1	83.1
Aichi	153.5	116.7	88.3
Mie	56.2	94.9	87.8
Shiga	54.6	78.6	80.2
Kyoto	193.6	118.1	82.8
Osaka	97.9	103.9	89.3
Hyogo	173.8	90.2	89.4
Nara	5.5	100.0	80.3
Wakayama	32.9	80.3	83.5
Tottori	18.4	69.1	100.3
Shimane	483.8	84.2	117.6
Okayama	352.9	117.2	97.3

Hiroshima	18.9	82.3	94.4
Yamaguchi	61.6	84.8	93.5
Tokushima	1.4	90.2	89.4
Kagawa	115.2	88.4	86.7
Ehime	78.9	74.3	96.0
Kochi	3.2	80.0	90.9
Fukuoka	115.0	97.7	81.8
Saga	1.8	76.3	80.0
Nagasaki	5.5	81.2	91.4
Kumamoto	251.2	90.9	84.9
Oita	43.4	80.7	83.5
Miyazaki	118.6	90.7	84.0
Kagoshima	103.4	79.7	75.3
Okinawa	40.4	137.3	93.4

*Standardized claim ratio of 100 indicates national mean (reference).

Abbreviation: CBT, cognitive behavioral therapy.

STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology*
Checklist for cohort, case-control, and cross-sectional studies (combined)

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	Title page
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	P1–2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	P3–5
Objectives	3	State specific objectives, including any pre-specified hypotheses	P5
Methods			
Study design	4	Present key elements of study design early in the paper	P6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	P6–7
Participants	6	(a) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants	N/A
		(b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —For matched studies, give matching criteria and the number of controls per case	N/A
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	P6–10
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	P6–10
Bias	9	Describe any efforts to address potential sources of bias	N/A
Study size	10	Explain how the study size was arrived at	N/A
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	P9–10
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	P9–10
		(b) Describe any methods used to examine subgroups and interactions	N/A
		(c) Explain how missing data were addressed	N/A
		(d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed	N/A

136/bmjopen-2019-033386 on 5 May 2020. Downloaded from <http://bmjopen.bmj.com/> on June 8, 2025 at Department of Epidemiology and Public Health, University College London UCL Library Services. For uses related to text and data mining, AI training, and similar technologies.

		<i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy	
		(e) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	P11
		(b) Give reasons for non-participation at each stage	N/A
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	P11
		(b) Indicate number of participants with missing data for each variable of interest	N/A
		(c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time	N/A
		<i>Case-control study</i> —Report numbers in each exposure category, or summary measures for each exposure	N/A
		<i>Cross-sectional study</i> —Report numbers of outcome events or summary measures	N/A
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	P11–13
		(b) Report category boundaries when continuous variables were categorized	N/A
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	P13–14
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	P18–19
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	P13–20
Generalisability	21	Discuss the generalisability (external validity) of the study results	P18
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	P20

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.
Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

How was cognitive behavioral therapy for mood disorder implemented in Japan?: a retrospective observational study using the nationwide claims database from FY2010 to FY2015

Journal:	BMJ Open
Manuscript ID	bmjopen-2019-033365.R2
Article Type:	Original research
Date Submitted by the Author:	25-Feb-2020
Complete List of Authors:	Hayashi, Yuta; University of Miyazaki, Graduate School of Medicine and Veterinary Medicine Yoshinaga, Naoki; University of Miyazaki, School of Nursing, Faculty of Medicine Sasaki, Yosuke; University of Miyazaki, Department of Animal and Grassland Sciences, Faculty of Agriculture; University of Miyazaki, Center for Animal Disease Control Tanoue, Hiroki; University of Miyazaki, Graduate School of Medicine and Veterinary Medicine; University of Miyazaki, School of Nursing, Faculty of Medicine Yoshimura, Kensuke; Chiba University Hospital, Center for Next Generation of Community Health Kadowaki, Yuko; University of Miyazaki Hospital, Clinical Research Support Center Arimura, Yasuji; University of Miyazaki Hospital, Clinical Research Support Center Yanagita, Toshihiko; University of Miyazaki, School of Nursing, Faculty of Medicine; University of Miyazaki Hospital, Clinical Research Support Center Ishida, Yasushi; University of Miyazaki, Division of Psychiatry, Department of Clinical Neuroscience, Faculty of Medicine
Primary Subject Heading:	Mental health
Secondary Subject Heading:	Epidemiology
Keywords:	cognitive behavioral therapy, database, national health insurance, Japan, MENTAL HEALTH

SCHOLARONE™
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

Title of article:

How was cognitive behavioral therapy for mood disorder implemented in Japan?: a retrospective observational study using the nationwide claims database from FY2010 to FY2015

Corresponding author:

Naoki Yoshinaga, School of Nursing, Faculty of Medicine, University of Miyazaki, 5200 Kihara, Kiyotake, Miyazaki 889-1692, Japan. E-mail: naoki-y@med.miyazaki-u.ac.jp Tel/Fax: (+81)985-85-9784

Authors:

Yuta Hayashi,¹ Naoki Yoshinaga,² Yosuke Sasaki,^{3,4} Hiroki Tanoue,^{1,2} Kensuke Yoshimura,⁵ Yuko Kadowaki,⁶ Yasuji Arimura,⁶ Toshihiko Yanagita,^{2,6} Yasushi Ishida⁷

¹ Graduate School of Medicine and Veterinary Medicine, University of Miyazaki, Miyazaki, Japan

² School of Nursing, Faculty of Medicine, University of Miyazaki, Miyazaki, Japan

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

³ Department of Animal and Grassland Sciences, Faculty of Agriculture, University of Miyazaki, Miyazaki, Japan

⁴ Center for Animal Disease Control, University of Miyazaki, Miyazaki, Japan

⁵ Center for Next Generation of Community Health, Chiba University Hospital, Chiba, Japan

⁶ Clinical Research Support Center, University of Miyazaki Hospital, Miyazaki, Japan

⁷ Division of Psychiatry, Department of Clinical Neuroscience, Faculty of Medicine, University of Miyazaki, Miyazaki, Japan

Word count: 3,362

ABSTRACT

Objectives: To clarify the dissemination status of cognitive behavioral therapy (CBT) in Japan under the national health insurance scheme.

Design: Retrospective observational study.

Setting: National Database of Health Insurance Claims and Specific Health Checkups of Japan.

Participants: Patients who received CBT under the national health insurance scheme from fiscal years (FY) 2010 to 2015.

Primary and secondary outcome measures: We estimated the change rate and the standardized claim ratio (SCR) for the number of patients receiving CBT and analyzed the association between the CBT status and several regional factors.

Results: We found that: (a) a total of 60,304 patients received CBT during the study period; (b) the number of patients receiving CBT was highest in the first year (-1.8% from FY2010 to FY2015); (c) the number of patients who received CBT per 100,000 population decreased (or remained at zero) in most prefectures (32 out of 47); (d) there was a maximum 424.7-fold difference between prefectures in standardized claim ratio for CBT; (e) the number of registered CBT institutions was significantly associated with the number of patients who received CBT.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Conclusions: The provision of CBT did not increase in the first six years (FY2010–2015) after its coverage in Japan's national health insurance scheme. Further studies including a questionnaire survey of registered CBT institutions are required to get more detailed information on the dissemination of CBT in Japan.

Strengths and limitations of this study:

- This is the first study to describe the provision status of cognitive behavioral therapy (CBT) in Japan using a nationwide database which covers all electronic claims in Japan’s national health insurance system.
- The main limitation of this study is that our data does not include medical treatment data for any treatment provided outside the national system (e.g. private counseling).
- The ecological analysis was conducted using specific variables, so there could be other factors which affect the provision of CBT.

32 INTRODUCTION

33 Disseminating effective treatment for psychiatric disorders is urgently required around
34 the world. Mathers and Loncar[1] reported that major depression is predicted to be the
35 leading cause of burden of disease in high-income countries by 2030; HIV/AIDS and
36 perinatal disorders rank higher only in low-income and middle-income countries.
37 Although mood disorders including major depression have been reported to be less
38 prevalent in Asian countries than in Western countries, they have become more
39 common among Japanese since the 2000's, which might reflect the Japanese
40 government's attempt to raise people's awareness of mental health.[2, 3] The rate of
41 mental health service use in Japan has also increased in the past twenty years.[4]

42 Since the 1980s, effective psychological interventions for a wide range of
43 psychiatric disorders have been empirically developed. Among them, cognitive
44 behavioral therapy (CBT) has consistently been shown to be effective for various
45 psychiatric disorders on both a short- and long-term basis,[5-13] and has also been a
46 strongly recommended treatment option for both inpatients and outpatients in national
47 guidelines.[14-18] Importantly, patients often desire to receive psychotherapy rather
48 than pharmacotherapy.[19, 20] However, there is evidence that empirically supported

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

35

36

37

38

39

40

41

42

43

44

45

46

47

48

49

50

51

52

53

54

55

56

57

58

59

60

61

62

63

64

65

66

67

68

69

70

71

72

73

74

75

76

77

78

79

80

81

82

83

84

85

86

87

88

89

90

91

92

93

94

95

96

97

98

99

100

101

102

103

104

105

106

107

108

109

110

111

112

113

114

115

116

117

118

119

120

121

122

123

124

125

126

127

128

129

130

131

132

133

134

135

136

137

138

139

140

141

142

143

144

145

146

147

148

149

150

151

152

153

154

155

156

157

158

159

160

161

162

163

164

165

166

167

168

169

170

171

172

173

174

175

176

177

178

179

180

181

182

183

184

185

186

187

188

189

190

191

192

193

194

195

196

197

198

199

200

201

202

203

204

205

206

207

208

209

210

211

212

213

214

215

216

217

218

219

220

221

222

223

224

225

226

227

228

229

230

231

232

233

234

235

236

237

238

239

240

241

242

243

244

245

246

247

248

249

250

251

252

253

254

255

256

257

258

259

260

261

262

263

264

265

266

267

268

269

270

271

272

273

274

275

276

277

278

279

280

281

282

283

284

285

286

287

288

289

290

291

292

293

294

295

296

297

298

299

300

301

302

303

304

305

306

307

308

309

310

311

312

313

314

315

316

317

318

319

320

321

322

323

324

325

326

327

328

329

330

331

332

333

334

335

336

337

338

339

340

341

342

343

344

345

346

347

348

349

350

351

352

353

354

355

356

357

358

359

360

361

362

363

364

365

366

367

368

369

370

371

372

373

374

375

376

377

378

379

380

381

382

383

384

385

386

387

388

389

390

391

392

393

394

395

396

397

398

399

400

401

402

403

404

405

406

407

408

409

410

411

412

413

414

415

416

417

418

419

420

421

422

423

424

425

426

427

428

429

430

431

432

433

434

435

436

437

438

439

440

441

442

443

444

445

446

447

448

449

450

451

452

453

454

455

456

457

458

459

460

461

462

463

464

465

466

467

468

469

470

471

472

473

474

475

476

477

478

479

480

481

482

483

484

485

486

487

488

489

490

491

492

493

494

495

496

497

498

499

500

501

502

503

504

505

506

507

508

509

510

511

512

513

514

515

516

517

518

519

520

521

522

523

524

525

526

527

528

529

530

531

532

533

534

535

536

537

538

539

540

541

542

543

544

545

546

547

548

549

550

551

552

553

554

555

556

557

558

559

560

561

562

563

564

565

566

567

568

569

570

571

572

573

574

575

576

577

578

579

580

581

582

583

584

585

586

587

588

589

590

591

592

593

594

595

596

597

598

599

600

601

602

603

604

605

606

607

608

609

610

611

612

613

614

615

616

617

618

619

620

621

622

623

624

625

626

627

628

629

630

631

632

633

634

635

636

637

638

639

640

641

642

643

644

645

646

647

648

649

650

651

652

653

654

655

656

657

658

659

660

661

662

663

664

665

666

667

668

669

670

671

672

673

674

675

676

677

678

679

680

681

682

683

684

685

686

687

688

689

690

691

692

693

694

695

696

697

698

699

700

701

702

703

704

705

706

707

708

709

710

711

712

713

714

715

716

717

718

719

720

721

722

723

724

725

726

727

728

729

730

731

732

733

734

735

736

737

738

739

740

741

742

743

744

745

746

747

748

749

750

751

752

753

754

755

756

757

758

759

760

761

762

763

764

765

766

767

768

769

770

771

772

773

774

775

776

777

778

779

780

781

782

783

784

785

786

787

788

789

790

791

792

793

794

795

796

797

798

799

800

801

802

803

804

805

806

807

808

809

810

811

812

813

814

815

816

817

818

819

820

821

822

823

824

825

826

827

828

829

830

831

832

833

834

835

836

837

838

839

840

841

842

843

844

845

846

847

848

849

850

851

852

853

854

855

856

857

858

859

860

861

862

863

864

865

866

867

868

869

870

871

872

873

874

875

876

877

878

879

880

881

882

883

884

885

886

887

888

889

890

891

892

893

894

895

896

897

898

899

900

901

902

903

904

905

906

907

908

909

910

911

912

913

914

915

916

917

918

919

920

921

922

923

924

925

926

927

928

929

930

931

932

933

934

935

936

937

938

939

940

941

942

943

944

945

946

947

948

949

950

951

952

953

954

955

956

957

958

959

960

961

962

963

964

965

966

967

968

969

970

971

972

973

974

975

976

977

978

979

980

981

982

983

984

985

986

987

988

989

990

991

992

993

994

995

996

997

998

999

1000

1001

1002

1003

1004

1005

1006

1007

1008

1009

1010

1011

1012

1013

1014

1015

1016

1017

1018

1019

1020

1021

1022

1023

1024

1025

1026

1027

1028

1029

1030

1031

1032

1033

1034

1035

1036

1037

1038

1039

1040

1041

1042

1043

1044

1045

1046

1047

1048

1049

1050

1051

1052

1053

1054

1055

1056

1057

1058

1059

1060

1061

1062

1063

1064

1065

1066

1067

1068

1069

1070

1071

1072

1073

1074

1075

1076

1077

1078

1079

1080

1081

1082

1083

1084

1085

1086

1087

1088

1089

1090

1091

1092

1093

1094

1095

1096

1097

1098

1099

1100

1101

1102

1103

1104

1105

1106

1107

1108

1109

1110

1111

1112

1113

1114

1115

1116

1117

1118

1119

1120

1121

1122

1123

1124

1125

1126

1127

1128

1129

1130

1131

1132

1133

1134

1135

1136

1137

1138

1139

1140

1141

1142

1143

1144

1145

1146

1147

1148

1149

1150

1151

1152

1153

1154

1155

1156

1157

1158

1159

1160

1161

1162

1163

1164

1165

1166

1167

1168

1169

1170

1171

1172

1173

1174

1175

1176

1177

1178

1179

1180

1181

1182

1183

1184

1185

1186

1187

1188

1189

1190

1191

1192

1193

1194

1195

1196

1197

1198

1199

1200

1201

1202

1203

1204

1205

1206

1207

1208

1209

1210

1211

1212

1213

1214

1215

1216

1217

1218

1219

1220

1221

1222

1223

1224

1225

1226

1227

1228

1229

1230

1231

1232

1233

1234

1235

1236

1237

1238

1239

1240

1241

1242

1243

1244

1245

1246

1247

1248

1249

1250

1251

1252

1253

1254

1255

1256

1257

1258

1259

1260

1261

1262

1263

1264

1265

1266

1267

1268

1269

1270

1271

1272

1273

1274

1275

1276

1277

1278

1279

1280

1281

1282

1283

1284

1285

1286

1287

1288

1289

1290

1291

1292

1293

1294

1295

1296

1297

1298

1299

1300

1301

1302

1303

1304

1305

1306

1307

1308

1309

1310

1311

1312

1313

1314

1315

1316

1317

1318

1319

1320

1321

1322

1323

1324

1325

1326

1327

1328

1329

1330

1331

1332

1333

1334

1335

1336

1337

1338

1339

1340

1341

1342

1343

1344

1345

1346

1347

1348

1349

1350

1351

1352

1353

1354

1355

1356

1357

1358

1359

1360

1361

1362

1363

1364

1365

1366

1367

1368

1369

1370

1371

1372

1373

1374

1375

1376

1377

1378

1379

1380

1381

1382

1383

1384

1385

1386

1387

1388

1389

1390

1391

1392

1393

1394

1395

1396

1397

1398

1399

1400

1401

1402

1403

1404

1405

1406

1407

1408

1409

1410

1411

1412

1413

1414

1415

1416

1417

1418

1419

1420

1421

1422

1423

1424

1425

1426

1427

1428

1429

1430

1431

1432

1433

1434

1435

1436

1437

1438

1439

1440

1441

1442

1443

1444

1445

1446

1447

1448

1449

1450

1451

1452

1453

1454

1455

1456

1457

1458

1459

1460

1461

1462

1463

1464

1465

1466

1467

1468

1469

1470

1471

1472

1473

1474

1475

1476

1477

1478

1479

1480

1481

1482

1483

1484

1485

1486

1487

1488

1

Subsequently, since FY2011, the Japanese Ministry of Health Labor and Welfare (MHLW) has started to organize training for therapists to disseminate CBT. However, it is still unclear whether CBT is routinely implemented in Japanese clinical settings under the national health insurance scheme. Two studies have employed a questionnaire method to investigate the capability of providing CBT in Japanese psychiatric institutions, but the very low return/response rates (16.5% and 20.3%) limit the generalizability of the findings.[29, 30]

The current study aims to assess the dissemination status of CBT in the first six years (FY2010–2015) after its inclusion in the national insurance scheme in Japan, using the nationwide claims database. We selected ambulatory psychotherapy, the psychotherapy provided in the routine psychiatric outpatient care, as a reference. Data on the actual dissemination status of CBT (including regional variations) has never been widely available, and such data is needed to estimate the unmet need for services, to promote open discussion between policy makers and general public, and to guide mental health care policy initiatives in the future.

METHODS

Main data source and extracted data

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

85 The present retrospective observational study was conducted using data from the
86 National Database of Health Insurance Claims and Specific Health Checkups of Japan
87 (NDB), a Japanese nationwide health insurance claims database operated by the
88 MHLW. Japan utilizes a universal healthcare system, patients pay 10–30% of their total
89 medical fees according to patients' age and socioeconomic status. To earn all medical
90 fees, medical care facilities have to submit medical fee claims to their municipality (see
91 online supplementary figure 1). The NDB has all electronic claims, 99% of all claims
92 issued from hospitals and clinics,[31] and stores approximately 1.9 billion claims
93 annually. The claims data contains various clinical and procedural information, such as
94 patients' sex, age, month of examination, diagnostic code, medical practice code, drug
95 code, and hospital code. Personally identifiable data (e.g. name, beneficiary
96 identification number, date of birth) are automatically converted into hash values at the
97 time of storage in NDB to make it irreversibly anonymous.

98 We used accumulated NDB data from FY2010 to FY2015 regarding CBT
99 [code 180035910 and 180033210]. We also collected NDB data regarding ambulatory
100 psychotherapy as a reference (≥ 30 minutes [code 180012210] and < 30 minutes [code
101 180031010]). Ambulatory psychotherapy in the national health insurance scheme
102 includes any type of psychotherapy (e.g. supportive psychotherapy) implemented by

psychiatrists in routine outpatient care. We chose this as a reference to CBT because:

(1) both psychotherapies target only outpatients, and (2) both are provided only by a medical doctor (table 1). CBT and ambulatory psychotherapy cannot be ticked at the same time. Extracted NDB data provided the exact number of patients who received each psychotherapy in each age group and prefecture. Each patient was counted as "one" even though the patient received more than one session. We did not collect diagnostic codes because it is said that diagnostic codes in NDB do not reflect the actual patient's diagnosis due to insurance claims needs.[32] To address the uncertainty/inaccuracy of diagnostic codes in NDB, some studies have combined diagnostic codes with other reliable examination or treatment codes (e.g. breast cancer code + cancer treatment codes [surgery/chemotherapy/medication/radiation procedure]).[33] However, in the psychiatric field, diagnostic codes in NDB are usually based on medical doctors' own judgement, and there are no other reliable examination or treatment codes to determine specific disorders. Therefore, we only focused on reliable medical practice codes in this study.

Table 1. CBT and ambulatory psychotherapy in Japan's national health insurance scheme

CBT	Ambulatory psychotherapy
-----	--------------------------

	CBT(1) ^a	CBT(2)	≥ 30 min	< 30 min
Code	180035910	180033210	180012210	180031010
Time	> 30 min		≥ 30 min	5-30 min
Provider	trained designated psychiatrist ^{b, c}	trained medical doctor ^b	any psychiatrist	
Target	only mood disorder		any psychiatric disorder	
Institutional registration	+ ^d		-	
Medical fees per session	5,000 JPY (33 GBP)	4,200 JPY (28 GBP)	4,000 JPY (27 GBP)	3,300 JPY (22 GBP)
Maximum of medical fees per hour	10,000 JPY (67 GBP)	8,400 JPY (56 GBP)	8,000 JPY (54 GBP)	23,100 JPY ^e (155 GBP)

^a CBT(1) have been established since fiscal year 2012.

^b who received some kind of any training for CBT.

^c Designated psychiatrist (Mental Health and Welfare Law-authorized) who also cooperates with local psychiatric emergency medical services (e.g. holiday/night medical examinations).

^d Institutions need to register their institution's name along with CBT providers names (trained designated psychiatrists or trained medical doctors) to the Regional Bureau of Health and Welfare of Japan.

^e assuming that a psychiatrist sees 7 patients per hour.[34]

128 CBT, cognitive behavioral therapy; JPY, Japanese yen; GBP, Great Britain
 129 pound.

130 Exchange rate: 1 GBP = 150 JPY.

131

132 **Analysis**

133 Firstly, we calculated the change rate for the number of patients who received CBT or
 134 ambulatory psychotherapy from FY2010 through FY2015. A baseline for the rate of
 135 change for each psychotherapy was the number of patients in FY2010. Secondly, we
 136 calculated the number of patients who received each psychotherapy per 100,000
 137 population, and then assessed the increase or decrease in patients between FY2010 and
 138 FY2015 by prefecture. Thirdly, we calculated the standardized claim ratio (SCR) for the
 139 number of patients who received CBT. The indicator is based on the same logic as the
 140 standardized mortality ratio (e.g. it signifies that a prefecture with an SCR over 100 has
 141 more patients who received CBT than the national mean). The SCR is calculated
 142 according to the following formula;

$$\begin{aligned}
 \text{SCR} &= \frac{\Sigma \text{ Observed number (N) of claims}}{\Sigma \text{ Expected N of claims}} \times 100 \\
 &= \frac{\Sigma \text{ Observed N of claims by age group} \times 100}{\Sigma \text{ Population by age group} \times \text{Claim rate by age group}} \\
 &= \frac{\Sigma \text{ Observed N of claims by age group} \times 100}{\Sigma \text{ Population by age group} \times \frac{\text{Observed N of claims by age group in Japan}}{\text{Population by age group in Japan}}}
 \end{aligned}$$

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

144 Fourthly, in order to assess regional factors related to the provision of CBT, we
145 examined associations between CBT patients per 100,000 population and the following
146 variables: (1) registered institutions for CBT per 100,000 population from Regional
147 Bureau of Health and Welfare of Japan; (2) psychiatrists per 100,000 population from
148 the portal site for Japanese Government Statistics, by using linear mixed effects models.
149 Fixed effects were the above three variables and year; prefecture was included as a
150 random effect. We also investigated the association between SCR for CBT and the
151 implementation of formal CBT training (organized by the MHLW) using independent t-
152 test. The dependent variable was SCR for CBT, and the independent variables were
153 prefecture groups that had been classified according to whether or not formal CBT
154 training had been implemented (at least 1 time). Significant differences were indicated
155 at p value < 0.05. Data were analyzed using the SAS software ver. 9.4 (SAS Institute
156 Inc., Cary, NC, USA).

157

158 **Patient and public involvement**

159 Patients or public were not involved in this study.

160

161 **Results**

During the study period (FY2010–2015), 60,304 patients received CBT and 34,628,225 patients received ambulatory psychotherapy. There is no big difference in terms of demographic data between these psychotherapies: more females than males received each psychotherapy, with most patients (male and female) being aged between 20–59 (see online supplementary table 1). As for trends over time (figure 1), the number of patients who received CBT dropped in FY2012 and thereafter recovered slightly from FY2013, but not to the level of FY2010 (when CBT was first added to the health insurance scheme). CBT patients decreased by 1.8% from FY2010 to FY2015. In contrast, the number of patients who received both types of ambulatory psychotherapy continued to increase; of these, ambulatory psychotherapy (≥ 30 min) increased dramatically from FY2012.

[Insert figure 1 about here]

At the prefectural level, from FY2010 to FY2015, patients receiving CBT per 100,000 population decreased (or remained at zero) in 32 of 47 prefectures, whereas patients receiving ambulatory psychotherapy per 100,000 population increased in all prefectures. Figure 2 shows the SCR for the number of patients who received each psychotherapy in the study period. There was a maximum 424.7-fold difference in SCR between the highest (SCR = 585.2 in Ishikawa) and lowest (SCR = 1.4 in Tokushima)

prefectures. Meanwhile, there was a maximum 3.4-fold difference in SCR of ambulatory psychotherapy (see online supplementary table 2).

[Insert figure 2 about here]

In terms of the relationship between regional factors and the provision of CBT, the number of patients who received CBT per 100,000 population was associated significantly with the number of registered CBT institutions per 100,000 population ($p < 0.01$) (table 2). If the number of registered institutions per 100,000 population increased by one, the number of patients increased by 23.1 (standard error = 3.4) patients per 100,000 population. The other factors were not associated with the number of CBT patients per 100,000 population or SCR for CBT (table 2 and 3).

Table 2. Results of ecological analysis on factors associated with number of patients who received CBT per 100,000 population (FY2010–2015)						
		Estimate	Standard error	Degree of freedom	T value	p value
Number of registered CBT institutions per 100,000 population	Intercept	-5.0	2.6	46	-1.9	0.06
	Slope	23.1	3.4	137	6.7	< 0.01*
Number of psychiatrists	Intercept	4.4	5.9	46	0.7	0.46

per 100,000 population	Slope	0.3	0.4	91	0.6	0.52
---------------------------	-------	-----	-----	----	-----	------

* indicates significant difference.

CBT, cognitive behavioral therapy; FY, fiscal year.

Table 3. Association between implementation of formal CBT training and SCR for CBT (FY2010–2015)

	Training [-]	Training [+]	p value
Prefectures (n)	37	10	-
SCR for CBT (Mean \pm SE)	98.0 \pm 23.0	73.2 \pm 19.9	0.59

Degree of freedom = 45, t value = 0.54.

CBT, cognitive behavioral therapy; SCR, standardized claim ratio; FY, fiscal year; SE, standard error.

DISCUSSION

This is the first study to use the nationwide claim database to demonstrate in detail the provision status of CBT in Japan in the first six years (FY2010–2015) after its inclusion in the national health insurance scheme. Our results show that: (a) approximately 60,000 patients received CBT during the study period; (b) the number of patients receiving CBT was highest in the first year (-1.8% from FY2010 to FY2015); (c) the

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

204 number of patients receiving CBT per 100,000 decreased (or remained at zero) in most
205 prefectures (32 out of 47); (d) based on SCR, there was a maximum 420-fold regional
206 difference in the number of CBT patients between prefectures; (e) the number of
207 registered CBT institutions was significantly associated with the number of patients
208 receiving CBT. Overall, the current study indicates that the provision of CBT did not
209 increase under Japan’s health insurance scheme from FY2010 to FY2015.

210 The reasons that the provision of CBT reached a plateau in Japan could be due
211 to strict requirements and low medical fees for therapists/institutions in the national
212 health insurance system. For example, a CBT provider must be a medical doctor, must
213 target only outpatients with mood disorder, and the provider’s institution must be
214 registered to the Regional Bureau of Health and Welfare of Japan (table 1). In terms of
215 medical fees, CBT fees in Japan are substantially lower than those in Western countries.
216 For example, in Japan, maximum fee for CBT is 5,000 Japanese yen (JPY) per session
217 (equal to 33 Great Britain pounds [GBP], exchange rate: 1 GBP = 150 JPY), whereas
218 the fee in England is 97 GBP (equal to 14,550 JPY) per session.[35] Moreover, CBT
219 fees are almost the same as ambulatory psychotherapy fees for sessions over 30 minutes
220 despite the aforementioned restrictions (table 1). Thus, ambulatory psychotherapy
221 sessions under 30 minutes yield the highest profits for medical doctors in Japan’s

Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.
Erasmushogeschool

national health insurance system. Indeed, Japanese psychiatrists see 7 outpatients per hour in routine clinical practice.[34] Furthermore, some studies have reported that the main obstacles in providing psychotherapy/CBT in Japan are a lack of time and profitability.[29, 30] Thus, more reasonable medical fees and requirements suitable to the actual conditions of routine clinical practice could motivate the use of CBT under the national health insurance scheme in Japan. Although we focused mainly on outpatient settings here, CBT for inpatients should also be included in the national health insurance scheme because it is recommended for inpatients with some disorders as well as in many international guidelines.

This study focused on CBT but a large shift in ambulatory psychotherapy (≥ 30 min) in FY2012 should be addressed. It seems that this large shift was caused by the revision of medical fee requirements for ambulatory psychotherapy in that year. Before the revision in FY2012, psychiatrists at any psychiatric institution were able to claim one type of ambulatory psychotherapy when they spent more than 60 minutes with a patient for the first visit. However, the revision imposed cooperation with local psychiatric emergency medical services (e.g. holiday/night medical examinations) on psychiatrists for this type of ambulatory psychotherapy. Because of this, many psychiatrists (especially those working at small psychiatric institutions) were no longer

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

240 able to claim the optional fees for ambulatory psychotherapy applied on the first visit.

241 As a result, it is possible that psychiatrists started claiming outpatients in the first visit
242 as covered by "ambulatory psychotherapy (≥ 30 min)".

243 Our results also showed a maximum approximately 420-fold difference in SCR
244 for CBT between prefectures, so there was a large regional variation in CBT utilization.
245 In particular, SCR was low over the whole Tohoku region where effective treatment for
246 psychiatric disorders is in high demand because of the high suicide rate.[36] On the
247 other hand, one of the reasons for the large variation in SCR between prefectures may
248 be that the total number of CBT patients in Japan is small. Therefore, if a single
249 institution in a particular prefecture has many CBT patients, the SCR in that area would
250 be overestimated because it is an indicator calculated from the national mean.

251 During the study period, formal CBT training had been implemented in 10 out
252 of 47 prefectures. We predicted that the implementation of formal CBT training would
253 be associated with SCR for CBT, but there was no association between these variables.
254 The training consists of a two-day onsite workshop and continuous online clinical
255 supervision. Thus, one of the reasons that medical doctors in regions with no workshop
256 training can continue to provide CBT may be because they can receive continuous
257 online supervised instruction irrespective of area. There was also a significant

Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.
Erasmushogeschool

association between the number of CBT patients per 100,000 population and the number of registered CBT institutions per 100,000 population. These results suggest that an increase in institutions that have formally-trained medical doctors and that meet institutional criteria for CBT could lead to a wide-scale dissemination of CBT under the national health insurance scheme.

To make CBT much more widely available, recent success in England also offers lessons that are likely applicable to Japan. In England, the number of patients with depression finishing CBT increased by 181.2% from FY2013 to FY2018 (28,814 patients to 81,038 patients).[37] One of the reasons for this success could be an increase in the number of therapists through a government-funded one-year systematic training, IAPT (over new 7,000 therapists have trained in FY2015[38]). The NHS has instigated this initiative based on data including economic evaluation in demonstration sites.[39] Towards a successful dissemination of CBT, it is necessary to continue accumulating research-based data, advocating and appealing for the required funding and organizational support, and train CBT therapists.[22] Health care policymakers may require data showing that CBT for mental disorders will in fact reduce costs to health care systems in the long-term. Future studies should therefore attempt to demonstrate

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

275 the long-term cost-effectiveness of CBT for various mental disorders in Japanese
276 clinical settings.[40]

277 The strength of this study is that the data source was the NDB, a
278 comprehensive database which covers all electronic claims in Japan’s national health
279 insurance system. However, there are also several limitations. First, the NDB does not
280 store medical treatment data for any treatment provided outside the national system (e.g.
281 private counseling). Although CBT for depression in Japan is mainly provided by
282 psychologists in routine care,[41] it is not covered by the national health insurance
283 system. Thus, there is a possibility that more CBT was actually conducted across Japan,
284 even in prefectures with few CBT patients under the health insurance scheme. Second,
285 we selected ambulatory psychotherapy as a reference to CBT because both
286 psychotherapies target only outpatients and both are provided only by a medical doctor.
287 However, this is still not an ideal reference because the provider and target of both
288 psychotherapies are not perfect analogs. Third, our ecological analysis was conducted
289 using specific variables. There could be other factors which affect the provision of CBT.
290 Finally, the observation period in this study is slightly outdated due to a delayed
291 acquisition process for NDB data from the MHLW. However, we believe that the
292 current study still has academic value for the following reasons. First, this is the first

Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.
Erasmushogeschool

293 study to demonstrate the status of CBT in Japan using comprehensive public data.

294 Second, our findings would be useful to future researchers/policymakers reviewing the
295 status of CBT in Japan after the observation period of this study. Because of these
296 limitations, further updates on the NDB (FY2016–) and the questionnaire survey of
297 registered CBT institutions are required.

298 Overall, this study revealed some issues regarding the provision of CBT in
299 Japan in the first six years (FY2010–FY2015) after its coverage in the national health
300 insurance scheme. The number of patients receiving CBT in Japan did not increase
301 probably due to unprofitability for therapists/institutions in Japan's current healthcare
302 insurance system. Further, there were large regional variations in CBT status between
303 the 47 prefectures and a significant association between the number of CBT patients per
304 100,000 population and the number of registered CBT institutions per 100,000
305 population. These findings suggest that an appropriate evaluation of medical fees for
306 CBT in clinical settings and supporting hospitals and/or clinics in meeting the
307 institutional criteria for CBT would help in the widespread utilization of CBT in Japan.
308 Further research into the status of CBT in Japan after the observation period of this
309 study (FY2016–) and a questionnaire survey of registered CBT institutions are required
310 to get more detailed information on the dissemination of CBT.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

311

312

313

314

315

316

317

318

319

320

321

322

323

324

325

326

327

328

Acknowledgements: The authors are grateful to Mr. Richard White for checking the English, and to Ms. Chieko Fujiyama for supporting data collection and entry.

Author Contributions: Conception and design of the study: YH, NY, HT, KY, YK, YA, TY, and YI; Acquisition of data: YH and NY; Analysis and interpretation of data: YH, NY, YS, HT, KY, YK, YA, TY, and YI; Drafting the manuscript: YH, NY, and YS. All authors critically reviewed the manuscript and approved of the final version.

Funding: This work was supported by a FY2017 (21th) research grant for young researchers from the Japanese Institute for Health Economics and Policy (<https://www.ihep.jp>) (to NY).

Competing interests: NY has received a speaking honorarium from Gakken Medical Support, and writing honoraria from Igaku Shoin, Nihon-Hyouronsha, Sogensha, and Medical Friend. The other authors declare that they have no conflicts of interest.

Patients consent for publication: Not required.

Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.
Erasmushogeschool

329

330 **Ethics approval:** The study protocol was reviewed and approved by the Ethics
331 Committee of the University of Miyazaki (reference number: O-0017). We also got
332 permission to use a dataset extracted from the NDB (reference number: 1025-1).
333 Written informed consent was waived because all patient records were automatically
334 anonymized prior to storage in NDB (i.e. no one can identify specific patients).

335

336 **Provenance and peer review:** Not commissioned; externally peer reviewed.

337

338 **Data sharing statement:** The data used in this study are from the Ministry of Health,
339 Labour and Welfare (MHLW) in Japan and therefore, users of these data are strictly
340 limited to those who obtain official permission from the MHLW, in accordance with
341 Japanese Article 33 (Provision of Questionnaire Information) of the Statistics Act, by
342 the Statistic Bureau, Ministry of Internal Affairs and Communications. Qualified
343 researchers who would like to request access to the data should contact the Statistics
344 and Information Department of the MHLW. Please refer to the following URL:
345 <http://www.mhlw.go.jp/toukei/sonota/chousahyo.html>.

REFERENCES

1. Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Med* 2006;3:e442 doi:10.1371/journal.pmed.0030442 [published Online First: 30 November 2006].

2. Steel Z, Marnane C, Iranpour C, et al. The global prevalence of common mental disorders: a systematic review and meta-analysis 1980-2013. *Int J Epidemiol* 2014;43:476-93 doi: 10.1093/ije/dyu038 [published Online First: 22 Mar 2014].

3. Ishikawa H, Tachimori H, Takeshima T, et al. Prevalence, treatment, and the correlates of common mental disorders in the mid 2010's in Japan: The results of the world mental health Japan 2nd survey. *J Affect Disord* 2018;241:554-62 doi: 10.1016/j.jad.2018.08.050 [published Online First: 29 Aug 2018].

4. Kawakami N, Tachimori H, Takeshima T, et al. Report of the World Mental Health Japan Survey 2nd (2013–2015). 2016 wmhj2.jp/WMHJ2-2016R.pdf [in Japanese] (accessed 20 Dec 2017).

5. Butler AC, Chapman JE, Forman EM, et al. The empirical status of cognitive-behavioral therapy: a review of meta-analyses. *Clin Psychol Rev* 2006;26:17-31 doi:10.1016/j.cpr.2005.07.003 [published Online First: 4 October 2005].

Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies. Erasmushogeschool

- 1
2
3
4
5 364 6. Sado M, Knapp M, Yamauchi K, et al. Cost-effectiveness of combination therapy
6
7
8 365 versus antidepressant therapy for management of depression in Japan. *Aust N Z J*
9
10
11 366 *Psychiatry* 2009;43:539-47 doi:10.1080/00048670902873664 [published Online
12
13
14 367 First: 15 May 2009].
- 15
16
17 368 7. Fujisawa D, Nakagawa A, Tajima M, et al. Cognitive behavioral therapy for
18
19
20 369 depression among adults in Japanese clinical settings: a single-group study. *BMC*
21
22
23 370 *Res Notes* 2010;3:160 doi:10.1186/1756-0500-3-160.
- 24
25
26 371 8. Cuijpers P, Berking M, Andersson G, et al. A meta-analysis of cognitive-
27
28
29 372 behavioural therapy for adult depression, alone and in comparison with other
30
31
32 373 treatments. *Can J Psychiatry* 2013;58:376-85 doi:10.1177/070674371305800702
33
34
35 374 [published Online First: 23 July 2013].
- 36
37
38 375 9. Wiles N, Thomas L, Abel A, et al. Cognitive behavioural therapy as an adjunct to
39
40
41 376 pharmacotherapy for primary care based patients with treatment resistant
42
43
44 377 depression: results of the CoBaT randomised controlled trial. *Lancet*
45
46
47 378 2013;381:375-84 doi:10.1016/s0140-6736(12)61552-9 [published Online First: 12
48
49
50 379 December 2012].
- 51
52
53 380 10. Nakagawa A, Mitsuda D, Sado M, et al. Effectiveness of Supplementary Cognitive-
54
55
56 381 Behavioral Therapy for Pharmacotherapy-Resistant Depression: A Randomized
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

382 Controlled Trial. *J Clin Psychiatry* 2017;78:1126-35 doi:10.4088/JCP.15m10511

383 [published Online First: 3 March 2017].

384 11. Takagaki K, Okamoto Y, Jinnin R, et al. Enduring effects of a 5-week behavioral

385 activation program for subthreshold depression among late adolescents: an

386 exploratory randomized controlled trial. *Neuropsychiatr Dis Treat* 2018;14:2633-

387 41 doi:10.2147/NDT.S172385 [published Online First: 24 October 2018].

388 12. Mavranetzouli I, Mayo-Wilson E, Dias S, et al. The Cost Effectiveness of

389 Psychological and Pharmacological Interventions for Social Anxiety Disorder: A

390 Model-Based Economic Analysis. *PLoS One* 2015;10:e0140704

391 doi:10.1371/journal.pone.0140704 [published Online First: 28 October 2015].

392 13. Sava FA, Yates BT, Lupu V, et al. Cost-effectiveness and cost-utility of cognitive

393 therapy, rational emotive behavioral therapy, and fluoxetine (Prozac) in treating

394 depression: a randomized clinical trial. *J Clin Psychol* 2009;65:36-52

395 doi:10.1002/jclp.20550 [published Online First: 4 December 2008].

396 14. National Institute for Clinical Excellence (NICE). Clinical guidelines [CG90].

397 Depression in adults: recognition and management. 2009

398 www.nice.org.uk/guidance/cg90 (accessed 20 Dec 2017).

Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.
Erasmus Hogeschool

- 1
2
3
4
5 399 15. American Psychiatric Association (APA). Practice guideline for the treatment of
6
7
8 400 patients with acute stress disorder and posttraumatic stress disorder second edition.
9
10
11 401 2010
12
13
14 402 www.psychiatryonline.org/pb/assets/raw/sitewide/practice_guidelines/guidelines/pa
15
16
17 403 nicdisorder.pdf (accessed 20 Dec 2017).
18
19
20 404 16. Hay P, Chinn D, Forbes D, et al. Royal Australian and New Zealand College of
21
22
23 405 Psychiatrists clinical practice guidelines for the treatment of eating disorders. *Aust*
24
25
26 406 *N Z J Psychiatry* 2014;48:977-1008 doi:10.1177/0004867414555814 [published
27
28
29 407 Online First: 30 October 2014].
30
31
32 408 17. Parikh SV, Quilty LC, Ravitz P, et al. Canadian Network for Mood and Anxiety
33
34
35 409 Treatments (CANMAT) 2016 Clinical Guidelines for the Management of Adults
36
37
38 410 with Major Depressive Disorder: Section 2. Psychological Treatments. *Can J*
39
40
41 411 *Psychiatry* 2016;61:524-39 doi:10.1177/0706743716659418 [published Online
42
43
44 412 First: 4 August 2016].
45
46
47 413 18. Japanese Society of Mood Disorders. Guideline for treatment of major depressive
48
49
50 414 disorder. 2016 www.secretariat.ne.jp/jsmd/mood_disorder/img/160731.pdf [in
51
52
53 415 Japanese] (accessed 20 Dec 2017).
54
55
56
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

416 19. McHugh RK, Whitton SW, Peckham AD, et al. Patient preference for
417 psychological vs pharmacologic treatment of psychiatric disorders: a meta-analytic
418 review. *J Clin Psychiatry* 2013;74:595-602 doi:10.4088/JCP.12r07757 [published
419 Online First: 12 July 2013].

420 20. Dwight-Johnson M, Sherbourne CD, Liao D, et al. Treatment preferences among
421 depressed primary care patients. *J Gen Intern Med* 2000;15:527-34
422 doi:10.1046/j.1525-1497.2000.08035.x [published Online First: 12 August 2000].

423 21. Shafran R, Clark DM, Fairburn CG, et al. Mind the gap: Improving the
424 dissemination of CBT. *Behav Res Ther* 2009;47:902-9
425 doi:10.1016/j.brat.2009.07.003 [published Online First: 12 August 2009].

426 22. Gunter RW, Whittal ML. Dissemination of cognitive-behavioral treatments for
427 anxiety disorders: Overcoming barriers and improving patient access. *Clin Psychol*
428 *Rev* 2010;30:194-202 doi:10.1016/j.cpr.2009.11.001 [published Online First: 28
429 November 2009].

430 23. Department of Health. IAPT three-year report: The first million patients. 2012
431 webarchive.nationalarchives.gov.uk/20160302155226/http://www.iapt.nhs.uk/silo/f
432 iles/iapt-3-year-report.pdf (accessed 30 Dec 2019).

Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.
Erasmus Hogeschool

- 1
2
3
4
5 433 24. NHS Digital. Psychological Therapies; Annual report on the use of IAPT services:
6
7
8 434 England 2018-19. 2019 files.digital.nhs.uk/1C/538E29/psych-ther-2018-19-ann-
9
10
11 435 rep.pdf (accessed 30 Dec 2019).
12
13
14 436 25. Ono Y, Furukawa TA, Shimizu E, et al. Current status of research on cognitive
15
16
17 437 therapy/cognitive behavior therapy in Japan. *Psychiatry Clin. Neurosci*
18
19
20 438 2011;65:121-9 doi:10.1111/j.1440-1819.2010.02182.x [published Online First: 19
21
22
23 439 March 2011].
24
25
26 440 26. International Narcotics Control Board. Report of the International Narcotics
27
28
29 441 Control Board on the Availability of Internationally Controlled Drugs: Ensuring
30
31
32 442 Adequate Access for Medical and Scientific Purposes. 2010
33
34
35 443 www.incb.org/documents/Publications/AnnualReports/AR2010/Supplement-
36
37
38 444 AR10_availability_English.pdf (accessed 20 Dec 2017).
39
40
41 445 27. Yoshio T. The trend for megadose polypharmacy in antipsychotic
42
43
44 446 pharmacotherapy: a prescription survey conducted by the psychiatric clinical
45
46
47 447 pharmacy research group. *Seishin Shinkeigaku Zasshi* 2012;114:690-95 [in
48
49
50 448 Japanese].
51
52
53 449 28. Okumura Y, Shimizu S, Matsumoto T. Prevalence, prescribed quantities, and
54
55
56 450 trajectory of multiple prescriber episodes for benzodiazepines: A 2-year cohort
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

451 study. *Drug Alcohol Depend* 2016;158:118-25

452 doi:10.1016/j.drugalcdep.2015.11.010.

453 29. Fujisawa D, Nakagawa A, Sado M, et al. Current status and dissemination of

454 psychotherapies in Japan. Japan Ministry of Health and Labor 2006 [in Japanese].

455 30. Takahashi F, Takegawa S, Okumura Y, et al. Actual condition survey on the

456 implementation of Cognitive Behavioral Therapy at psychiatric clinics in Japan.

457 2018 [www.ftakalab.jp/wordpress/wp-](http://www.ftakalab.jp/wordpress/wp-content/uploads/2011/08/japancbtclinic_report.pdf)

458 [content/uploads/2011/08/japancbtclinic_report.pdf](http://www.ftakalab.jp/wordpress/wp-content/uploads/2011/08/japancbtclinic_report.pdf) [in Japanese] (accessed 9 Jan

459 2018).

460 31. Japanese Ministry of Health, Labour and Welfare. Status of dissemination of

461 electronically submitted claims. 2015 [www.mhlw.go.jp/file/06-Seisakujouhou-](http://www.mhlw.go.jp/file/06-Seisakujouhou-12400000-Hokenkyoku/0000099002.pdf)

462 [12400000-Hokenkyoku/0000099002.pdf](http://www.mhlw.go.jp/file/06-Seisakujouhou-12400000-Hokenkyoku/0000099002.pdf) [in Japanese] (accessed 20 Dec 2017).

463 32. Nakayama T, Imanaka Y, Okuno Y, et al. Analysis of the evidence-practice gap to

464 facilitate proper medical care for the elderly: investigation, using databases, of

465 utilization measures for National Database of Health Insurance Claims and Specific

466 Health Checkups of Japan (NDB). *Environ Health Prev Med* 2017;22:51

467 doi:10.1186/s12199-017-0644-5

Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.
Erasmus Hogeschool

- 1
2
3
4
5 468 33. Sato I, Yagata H, Ohashi Y. The Accuracy of Japanese Claims Data in Identifying
6
7
8 469 Breast Cancer Cases. *Biol. Pharm. Bull* 2015;38:53-7.
9
10
11 470 34. Nakagawa A, Williams A, Sado M, et al. Comparison of treatment selections by
12
13
14 471 Japanese and US psychiatrists for major depressive disorder: A case vignette study.
15
16
17 472 *Psychiatry Clin. Neurosci* 2015;69:553-62 doi:10.1111/pcn.12273 [published
18
19
20 473 Online First: 21 Jan 2015].
21
22
23 474 35. Curtis L, Burns A. Unit Costs of Health and Social Care 2016, Personal Social
24
25
26 475 Services Research Unit. Canterbury: University of Kent 2016
27
28
29 476 www.pssru.ac.uk/project-pages/unit-costs/unit-costs-2016/ (accessed 20 Dec 2017).
30
31
32 477 36. Japanese Ministry of Health, Labour and Welfare. Number of suicide based on
33
34
35 478 statistics report by National Police Agency. 2019
36
37
38 479 www.mhlw.go.jp/content/201812-sokuhou.pdf [in Japanese] (accessed 25 Jan
39
40
41 480 2019).
42
43
44 481 37. NHS Digital. Psychological Therapies, Annual Reports on the use of IAPT
45
46
47 482 services. 2019 [digital.nhs.uk/data-and-](http://digital.nhs.uk/data-and-information/publications/statistical/psychological-therapies-annual-reports-on-the-use-of-iapt-services)
48
49
50 483 [information/publications/statistical/psychological-therapies-annual-reports-on-the-](http://digital.nhs.uk/data-and-information/publications/statistical/psychological-therapies-annual-reports-on-the-use-of-iapt-services)
51
52
53 484 [use-of-iapt-services](http://digital.nhs.uk/data-and-information/publications/statistical/psychological-therapies-annual-reports-on-the-use-of-iapt-services) (accessed 30 Dec 2019).
54
55
56
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

485 38. Clark DM. Realizing the Mass Public Benefit of Evidence-Based Psychological
486 Therapies: The IAPT Program. *Annu Rev Clin Psychol* 2018;14:159-83
487 doi:10.1146/annurev-clinpsy-050817-084833.

488 39. Clark DM, Layard R, Smithies R, et al. Improving access to psychological therapy:
489 Initial evaluation of two UK demonstration sites. *Behav Res Ther* 2009;47:910-20
490 doi: 10.1016/j.brat.2009.07.010 [published Online First: 2009/08/04].

491 40. Yoshinaga N, Kubota K, Yoshimura K, et al. Long-Term Effectiveness of
492 Cognitive Therapy for Refractory Social Anxiety Disorder: One-Year Follow-Up of
493 a Randomized Controlled Trial. *Psychother Psychosom* 2019;88:244-46 doi:
494 10.1159/000500108 [published Online First: 2019/05/24].

495 41. Sato H, Tanno Y. The Effect of Cognitive Behavioral Therapy for Depression
496 Delivered by Japanese Psychologists : A Systematic Review. *Japanese journal of*
497 *behavior therapy* 2012;38:157-67 [in Japanese].

Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.
Erasmus Hogeschool

Figure legends:

Figure 1. Trends over time for the number of outpatients who received psychotherapy in Japan.

FY, fiscal year.

Figure 2. Geographical distribution of standardized claim ratio (SCR) for the number of outpatients who received psychotherapy in Japan from fiscal years 2010 to 2015.

The color bar shows a degree of SCR. SCR of 100 indicates the national mean.

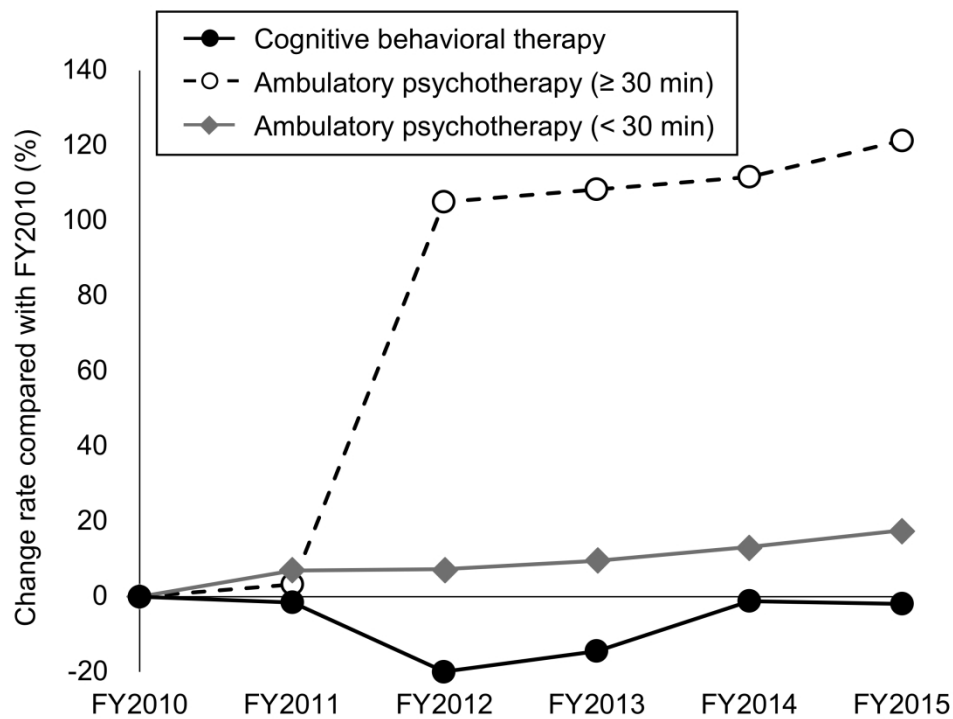


Figure 1. Trends over time for the number of outpatients who received psychotherapy in Japan. FY, fiscal year.

254x190mm (300 x 300 DPI)

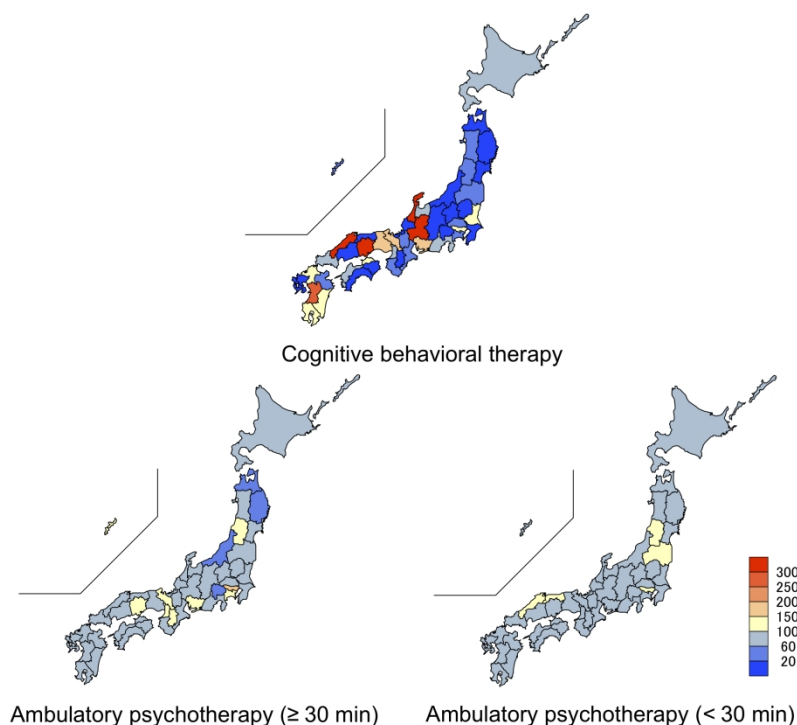
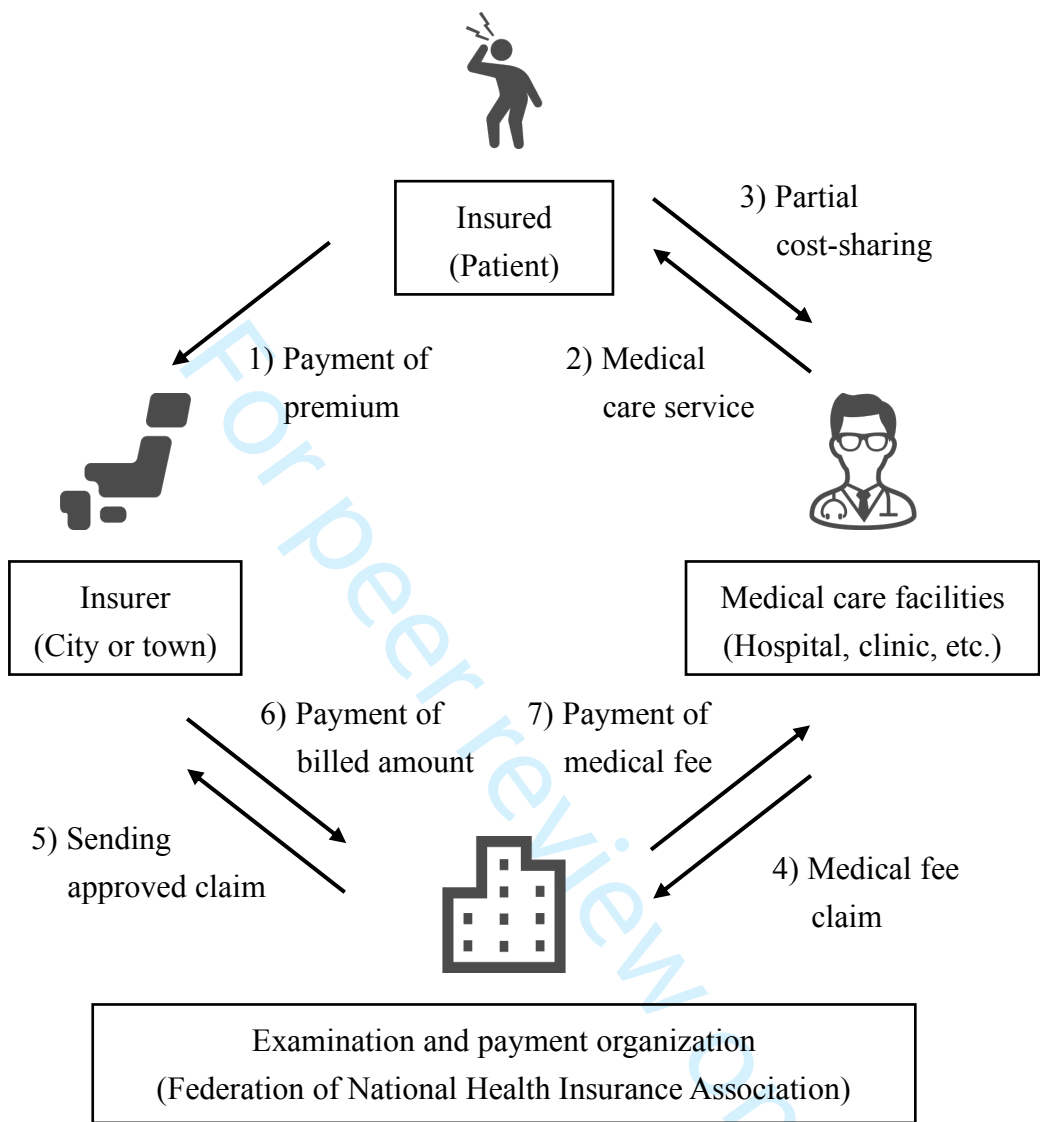


Figure 2. Geographical distribution of standardized claim ratio (SCR) for the number of outpatients who received psychotherapy in Japan from fiscal years 2010 to 2015. The color bar shows a degree of SCR. SCR of 100 indicates the national mean.

254x190mm (300 x 300 DPI)

Supplementary Figure 1. Overview of Japan's universal healthcare system



Supplementary Table 1. Demographic data of outpatients who received each psychotherapies by sex and age groups

	FY2010						FY2011					
	CBT	%	Ambulatory psychotherapy				CBT	%	Ambulatory psychotherapy			
			≥ 30 min	%	< 30 min	%			≥ 30 min	%	< 30 min	%
Male (years)	3,911	34.9	266,900	40.4	1,979,923	42.6	3,896	35.5	279,000	40.8	2,135,354	42.9
0-9	13	0.1	24,510	3.7	34,028	0.7	87	0.8	26,480	3.9	37,825	0.8
10-19	135	1.2	33,955	5.1	85,966	1.9	230	2.1	35,715	5.2	95,109	1.9
20-29	660	5.9	39,449	6.0	231,457	5.0	648	5.9	41,733	6.1	242,586	4.9
30-39	1,027	9.2	52,128	7.9	429,146	9.2	931	8.5	52,961	7.8	447,328	9.0
40-49	900	8.0	43,379	6.6	418,062	9.0	821	7.5	45,867	6.7	457,105	9.2
50-59	451	4.0	25,776	3.9	298,054	6.4	426	3.9	26,776	3.9	321,345	6.5
60-69	304	2.7	18,412	2.8	225,926	4.9	270	2.5	18,563	2.7	252,745	5.1
70-79	233	2.1	17,154	2.6	165,747	3.6	254	2.3	17,855	2.6	180,096	3.6
≥ 80	188	1.7	12,137	1.8	91,537	2.0	229	2.1	13,050	1.9	101,215	2.0
Female (years)	7,285	65.1	393,585	59.6	2,662,976	57.4	7,084	64.5	404,249	59.2	2,839,696	57.1
0-9	-*	-*	8,532	1.3	11,131	0.2	27	0.2	9,415	0.4	12,570	0.3
10-19	240	2.1	35,604	5.4	90,061	1.9	314	2.9	35,701	5.2	92,282	1.9
20-29	1,435	12.8	73,045	11.1	349,509	7.5	1,475	13.4	73,823	10.8	356,484	7.2
30-39	1,821	16.3	82,301	12.5	496,888	10.7	1,684	15.3	82,397	12.1	515,329	10.4
40-49	1,317	11.8	59,671	9.0	432,489	9.3	1,187	10.8	63,124	9.2	471,593	9.5
50-59	745	6.7	37,629	5.7	341,547	7.4	640	5.8	38,391	5.6	360,082	7.2
60-69	596	5.3	33,855	5.1	362,120	7.8	570	5.2	34,571	5.1	400,893	8.1
70-79	607	5.4	34,972	5.3	337,177	7.3	573	5.2	36,171	5.3	363,038	7.3
≥80	524	4.7	27,976	4.2	242,054	5.2	614	5.6	30,656	4.5	267,425	5.4
Total	11,196	100.0	660,485	100.0	4,642,899	100.0	10,980	100.0	683,249	100.0	4,975,050	100.0

	FY2012						FY2013					
	Ambulatory						Ambulatory					
	CBT	%	psychotherapy				CBT	%	psychotherapy			
			≥ 30 min	%	< 30 min	%			≥ 30 min	%	< 30 min	%
Male (years)	3,076	34.6	560,242	42.1	2,165,896	43.2	3,335	35.1	569,291	42.0	2,219,842	43.2
0-9	38	0.4	35,832	2.7	42,067	0.8	87	0.9	39,511	2.9	44,852	0.9
10-19	205	2.3	56,679	4.3	101,667	2.0	289	3.0	62,003	2.6	110,685	2.2
20-29	596	6.7	96,743	7.3	241,561	4.8	634	6.7	97,146	2.2	242,685	4.7
30-39	820	9.2	117,335	8.8	434,811	8.7	791	8.3	114,192	8.4	429,615	8.4
40-49	669	7.5	101,404	7.6	472,920	9.4	707	7.4	103,653	7.6	493,436	9.6
50-59	361	4.1	56,336	4.2	324,168	6.5	358	3.8	58,176	4.3	339,876	6.6
60-69	132	1.5	35,539	2.7	249,642	5.0	165	1.7	34,569	2.5	252,337	4.9
70-79	123	1.4	33,967	2.6	184,434	3.7	159	1.7	33,671	2.5	186,195	3.6
≥ 80	132	1.5	26,407	2.0	114,626	2.3	145	1.5	26,370	1.9	120,161	2.3
Female (years)	5,807	65.4	771,408	57.9	2,850,916	56.8	6,168	64.9	786,834	58.0	2,912,985	56.8
0-9	13	0.1	12,801	1.0	13,991	0.3	32	0.3	14,292	1.1	14,791	0.3
10-19	327	3.7	58,361	4.4	90,174	1.8	334	3.5	61,544	4.5	92,688	1.8
20-29	1,341	15.1	152,412	11.4	342,357	6.8	1,331	14.0	153,488	11.3	340,023	6.6
30-39	1,494	16.8	155,592	11.7	497,402	9.9	1,445	15.2	155,481	11.5	496,462	9.7
40-49	1,096	12.3	122,844	9.2	487,840	9.7	1,198	12.6	129,208	9.5	516,329	10.1
50-59	584	6.6	73,272	5.5	358,659	7.1	673	7.1	76,207	5.6	372,409	7.3
60-69	360	4.1	64,996	4.9	391,051	7.8	397	4.2	65,076	4.8	392,264	7.6
70-79	294	3.3	69,522	5.2	367,981	7.3	374	3.9	69,623	5.1	372,923	7.3
≥80	298	3.4	61,608	4.6	301,461	6.0	384	4.0	61,915	4.6	315,096	6.1
Total	8,883	100.0	1,331,650	100.0	5,016,812	100.0	9,503	100.0	1356,125	100.0	5,132,827	100.0

	FY2014						FY2015					
	CBT	%	Ambulatory psychotherapy				CBT	%	Ambulatory psychotherapy			
			≥ 30 min	%	< 30 min	%			≥ 30 min	%	< 30 min	%
Male (years)	3,875	35.3	586,888	42.6	2,300,881	43.5	3,865	35.3	622,021	43.1	2,403,172	43.7
0-9	33	0.3	43,989	3.2	50,390	1.0	40	0.4	47,545	0.3	57,976	1.1
10-19	349	3.2	64,301	4.7	119,572	2.3	413	3.8	71,046	4.0	134,036	2.4
20-29	689	6.3	99,072	7.2	248,292	4.7	781	7.1	106,333	7.4	260,323	4.7
30-39	963	8.8	113,575	8.2	427,762	8.1	894	8.2	115,858	8.0	427,604	7.8
40-49	791	7.2	107,432	7.8	517,169	9.8	757	6.9	112,828	6.8	539,896	9.8
50-59	458	4.2	61,797	4.5	361,529	6.8	427	3.9	67,209	4.7	386,159	7.0
60-69	206	1.9	35,107	2.5	258,163	4.9	224	2.0	36,744	2.5	267,293	4.9
70-79	202	1.8	33,992	2.5	191,525	3.6	194	1.8	35,160	2.4	195,045	3.6
≥ 80	184	1.7	27,623	2.0	126,479	2.4	135	1.2	29,298	2.0	134,840	2.5
Female (years)	7,095	64.7	791,424	57.4	2,992,615	56.5	7,077	64.7	819,723	56.9	3,090,963	56.3
0-9	21	0.2	15,395	1.1	16,580	0.3	25	0.2	16,761	0.2	18,807	0.3
10-19	427	3.9	61,191	4.4	95,814	1.8	499	4.6	67,150	4.7	103,448	1.9
20-29	1,390	12.7	150,502	10.9	338,609	6.4	1,398	12.8	154,718	10.7	344,264	6.3
30-39	1,568	14.3	152,600	11.1	494,340	9.3	1,533	14.0	152,159	10.6	494,355	9.0
40-49	1,528	13.9	133,540	9.7	545,860	10.3	1,636	15.0	139,034	9.6	573,414	10.4
50-59	779	7.1	79,907	5.8	393,351	7.4	830	7.6	85,473	5.9	416,398	7.6
60-69	432	3.9	63,576	4.6	394,986	7.5	373	3.4	65,256	4.5	400,465	7.3
70-79	467	4.3	70,617	5.1	383,780	7.3	399	3.6	71,180	4.9	389,717	7.1
≥80	483	4.4	64,096	4.7	329,295	6.2	384	3.5	67,992	4.7	350,095	6.4
Total	10,970	100.0	1,378,312	100.0	5,293,496	100.0	10,942	100.0	1,441,744	100.0	5,494,135	100.0

*Number of patients less than 10 people were noted as zero (-) in order to prevent unwanted identification of personal information.

Abbreviation: CBT, cognitive behavioral therapy; FY, fiscal year.

For peer review only - <http://bmjopen.bmj.com/site/about/guidelines.xhtml>

Supplementary Table 2. Standardized claim ratio of outpatients who received each psychotherapies by prefecture

Prefecture	CBT	Ambulatory psychotherapy	
		≥ 30 min	< 30 min
Japan	reference*	reference*	reference*
Hokkaido	63.8	74.5	94.7
Aomori	8.7	51.7	82.1
Iwate	8.6	57.8	88.5
Miyagi	19.7	97.5	88.3
Akita	29.0	99.4	90.3
Yamagata	51.8	118.3	106.3
Fukushima	29.7	89.0	102.6
Ibaraki	138.9	60.7	71.4
Tochigi	13.9	60.7	85.0
Gunma	18.9	98.0	91.7
Saitama	42.9	68.8	77.1
Chiba	15.5	73.0	87.6
Tokyo	144.2	176.2	118.7
Kanagawa	47.8	108.2	92.2
Niigata	11.3	57.3	96.0
Toyama	60.5	66.4	85.8
Ishikawa	585.2	71.1	89.2
Fukui	1.9	81.3	97.6
Yamanashi	14.6	57.4	71.8
Nagano	5.7	95.2	97.2
Gifu	388.0	86.9	78.9
Shizuoka	75.1	70.1	83.1
Aichi	153.5	116.7	88.3
Mie	56.2	94.9	87.8
Shiga	54.6	78.6	80.2
Kyoto	193.6	118.1	82.8
Osaka	97.9	103.9	89.3
Hyogo	173.8	90.2	89.4
Nara	5.5	100.0	80.3
Wakayama	32.9	80.3	83.5
Tottori	18.4	69.1	100.3
Shimane	483.8	84.2	117.6
Okayama	352.9	117.2	97.3

Hiroshima	18.9	82.3	94.4
Yamaguchi	61.6	84.8	93.5
Tokushima	1.4	90.2	89.4
Kagawa	115.2	88.4	86.7
Ehime	78.9	74.3	96.0
Kochi	3.2	80.0	90.9
Fukuoka	115.0	97.7	81.8
Saga	1.8	76.3	80.0
Nagasaki	5.5	81.2	91.4
Kumamoto	251.2	90.9	84.9
Oita	43.4	80.7	83.5
Miyazaki	118.6	90.7	84.0
Kagoshima	103.4	79.7	75.3
Okinawa	40.4	137.3	93.4

*Standardized claim ratio of 100 indicates national mean (reference).

Abbreviation: CBT, cognitive behavioral therapy.

STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology*
Checklist for cohort, case-control, and cross-sectional studies (combined)

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	Title page
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	P1–2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	P3–5
Objectives	3	State specific objectives, including any pre-specified hypotheses	P5
Methods			
Study design	4	Present key elements of study design early in the paper	P6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	P6–7
Participants	6	(a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants	N/A
		(b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed Case-control study—For matched studies, give matching criteria and the number of controls per case	N/A
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	P6–10
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	P6–10
Bias	9	Describe any efforts to address potential sources of bias	N/A
Study size	10	Explain how the study size was arrived at	N/A
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	P9–10
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	P9–10
		(b) Describe any methods used to examine subgroups and interactions	N/A
		(c) Explain how missing data were addressed	N/A
		(d) Cohort study—If applicable, explain how loss to follow-up was addressed Case-control study—If applicable, explain how matching of cases and controls was addressed	N/A

		<i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy	
		(e) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	P11
		(b) Give reasons for non-participation at each stage	N/A
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	P11
		(b) Indicate number of participants with missing data for each variable of interest	N/A
		(c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)	N/A
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time	N/A
		<i>Case-control study</i> —Report numbers in each exposure category, or summary measures for each exposure	N/A
		<i>Cross-sectional study</i> —Report numbers of outcome events or summary measures	N/A
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	P11–13
		(b) Report category boundaries when continuous variables were categorized	N/A
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	P13–14
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	P18–19
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	P13–19
Generalisability	21	Discuss the generalisability (external validity) of the study results	P18
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	P20

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.